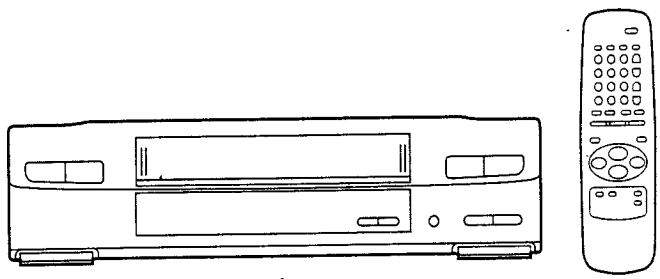
TOSHIBA

FILE NO. 110-9609

SERVICE MANUAL

VIDEO CASSETTE RECORDER

V-426B



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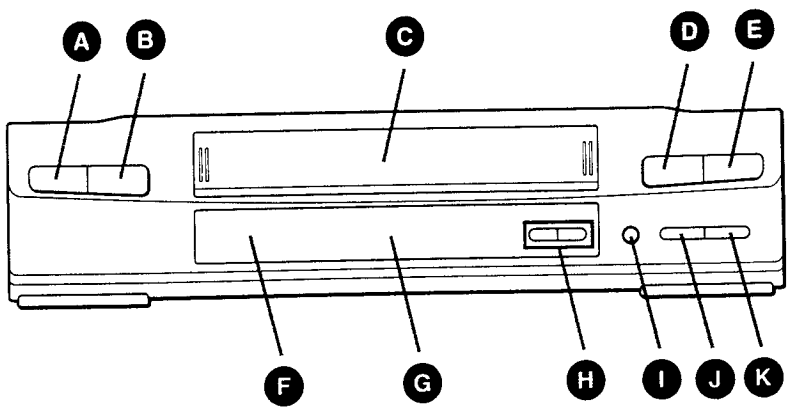
SECTION 1
GENERAL DESCRIPTIONS

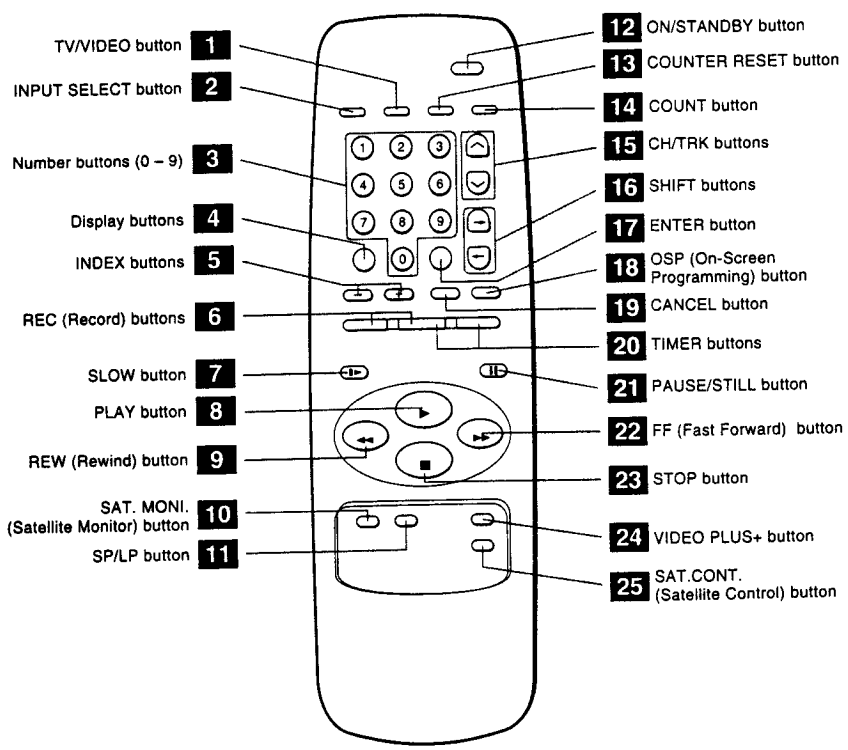
OPERATING INSTRUCTIONS

1. IDENTIFICATION OF CONTROLS

Front Panel



Remote Controller



Ⓐ ON/STANDBY button

Ⓑ EJECT button

Ⓒ Cassette compartment

Ⓓ PLAY button

Ⓔ STOP button

Ⓕ Remote sensor

Ⓖ VTR display

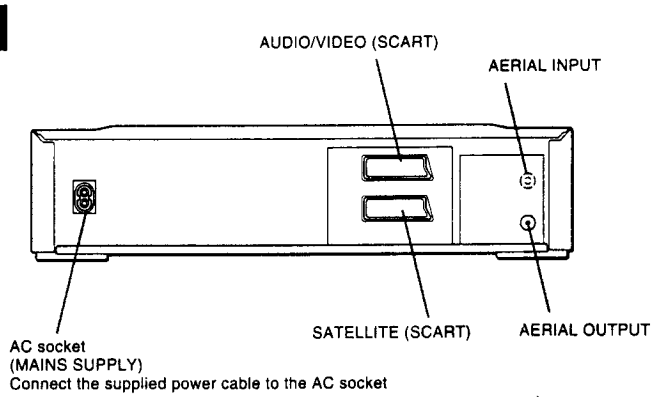
Ⓗ CHANNEL buttons

Ⓘ REC button

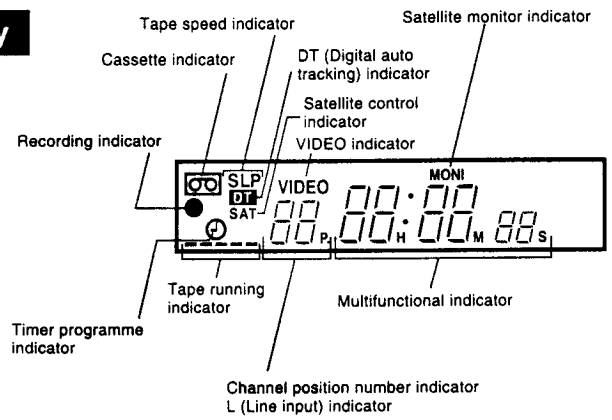
Ⓙ REW button

Ⓚ FF button

Rear Panel



VTR Display



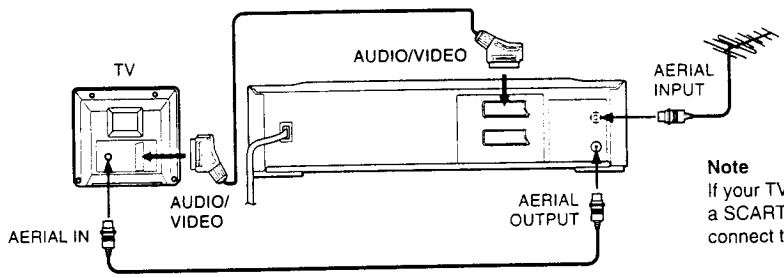
2. AUTO SET UP

The Auto Set Up function automatically tunes in all TV stations and sets the clock. All you have to do is to connect the VTR to your TV, and then plug the power cable into the mains outlet.

Auto Set Up

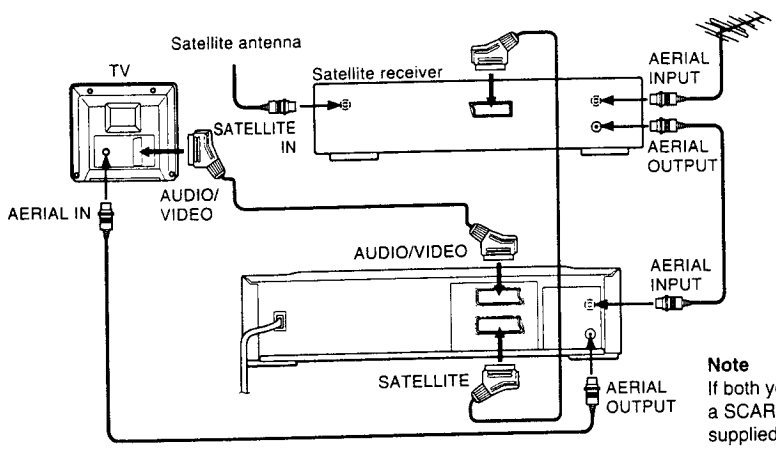
1 Connect the VTR to your TV with an aerial cable from the main antenna.

To receive TV stations only



Note
If your TV has a SCART socket, use a SCART cable (not supplied) to connect the VTR.

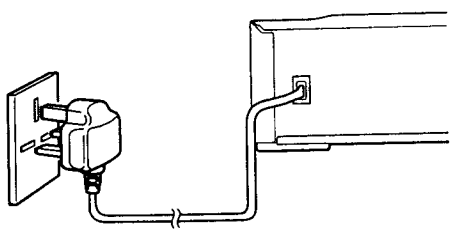
To receive satellite channels as well



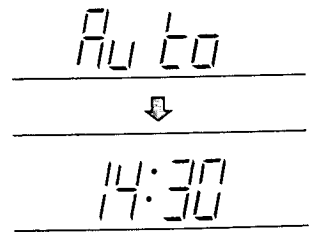
Note
If both your TV and satellite receiver have a SCART socket, use a SCART cable (not supplied) to connect the VTR.

Turn on the satellite receiver and tune to SKY ONE.

2 Plug in the VTR to start its Auto Set Up.
The display will flash "AUTO" for a few minutes.



VTR display



When complete, the display will show the time e.g. "14:30".

The Auto Set Up has now tuned in all the TV stations on this VTR and set the time.
You now need to set the video channel on your TV if you make a connection without the SCART cable. (See next page.)

Note
The Auto Set Up procedure above is available only on the first time you connect this VTR. See pages beginning from 30 for the next time.

3. WATCHING THE VIDEO PICTURE

The way you operate the unit to watch a video picture depends on whether you use a SCART cable or not.

For SCART Cable Users

■ **To watch a video picture from the VTR**
Insert a cassette and press the **PLAY** button on the remote controller or front panel of the VTR. 8 D

■ **To watch or record a programme from the connected satellite receiver**
Press the **INPUT SELECT** button so that "SA" indicator appear in the VTR display. 2

For Non-SCART Cable Users (Setting the Video Channel)

The VTR signals are sent to your TV from the AERIAL OUTPUT socket. Your TV must have a channel set aside exclusively for these VTR signals. This is called the video channel.

Preparation

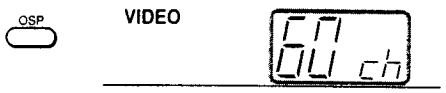
1 Turn on the TV.

2 Select a free channel on the TV which you wish to use for your video picture, for example channel 9.
This channel 9 will be only used for watching a video picture.

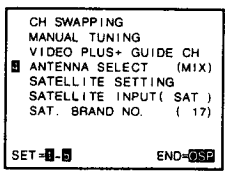
3 Press the **ON/STANDBY** button to turn on the VTR. 12 A

4 Hold down the **OSP** button **for more than 5 seconds.** 18

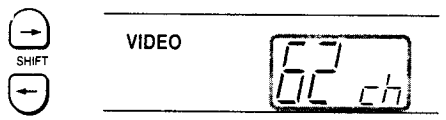
VTR display



5 Tune the TV (on channel 9 for example in step *2*) so that the following screen is shown clearly. (For tuning the TV, refer to the TV's manual.)



6 If after tuning (in step *5*), you still have some interference because of neighbouring broadcast channels, press the **SHIFT** button to select another video channel between channels 50 and 67. 16



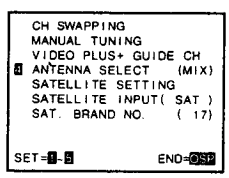
Re-tune the TV to around UHF channel 62 (for example), and confirm the screen is shown clearly.

7 Press the **OSP** button.
Video channel setting is complete.

Note on the antenna output

On the screen in step *5* in "Setting the Video Channel", the antenna output can be set to "MIX" or "SW". (Applied when the VTR is connected to your TV only via the AERIAL OUTPUT socket.)
Press **number button 4** to select "MIX" or "SW". 3

④



MIX: You can watch a video picture on the video channel regardless of whether or not you have pressed the TV/VIDEO button.
The switch should only be set to "SW" if the video pictures or TV pictures cannot be obtained clearly.

SW: You can watch a video picture on the video channel only when the "VIDEO" indicator is lit in the VTR display by pressing the TV/VIDEO button. 1

4. CHECKING AUTO SET UP / CHANNEL SWAPPING

This section explains how to check if the TV stations are stored on the VTR correctly. If they are not stored correctly, you must enter them manually.

Checking Auto Set Up

Using the **CH/TRK** buttons on the VTR's remote controller, check that the order of the TV stations stored on the VTR is as below. (This is important for the correct functioning of Video Plus+.) 15 H

Position number	TV Station
1	BBC1
2	BBC2
3	ITV
4	Channel 4
5	Channel 5 (From 1997)
6	Satellite Receiver

Position number 5 is reserved for Channel 5 and Position number 6 for a satellite receiver connected with an aerial cable. These positions will be empty if there is no satellite receiver connected, or if you cannot receive Channel 5 broadcast.

Any other stations are stored from position number 7 onward. If one of these has a better picture or is your preferred regional station, (e.g. Carlton instead of Meridian) then you can swap this into another position number. See the procedure below.

Channel Swapping

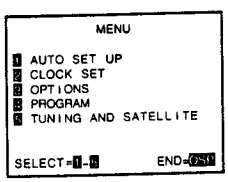
This VTR can move a TV station stored by Auto Set Up to another position number.
This is called "Channel Swapping".

Example **To move a TV station stored on position number 7 to position number 3.**

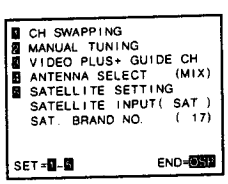
1 Select position number 7 with the **CH/TRK** buttons. 15

VTR display

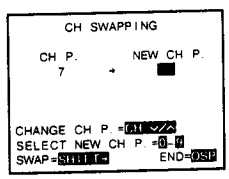
2 Press the **OSP** button. 18
The MENU screen appears.



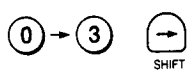
3 Press **number button 5** to select "TUNING AND SATELLITE". 3

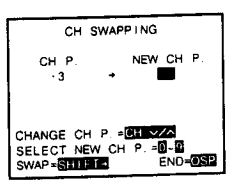


4 Press **number button 1**. 3
The following text will be superimposed over the position number you selected.



5 Press **number button 0** and **3** to select a new position number, then press the **SHIFT**(→) button. 3 16





6 To select another stored station to move, press the **CH/TRK** buttons and follow step *5*. 15

7 Press the **OSP** button. 18
Now Channel Swapping is completed.
Further press the **OSP** button twice to return to the normal TV screen.

5. ON SCREEN DISPLAY / VIDEO CASSETTE USE

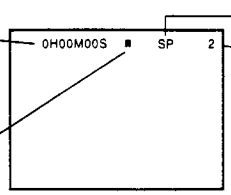
The VTR tells you current operating modes on the TV screen.

Displays and Indicators on the Screen

Pressing the **DISPLAY** button makes the operating mode appear. If you press this button again, the indication goes off, leaving the counter indication on the screen. To turn it off, press the **DISPLAY** button once more. 4

Counter indication
- Linear time counter
- Clock

Each time the **COUNT** button is pressed, the indication changes. 14



Recording tape speed (SP/LP/SLP)

Position number

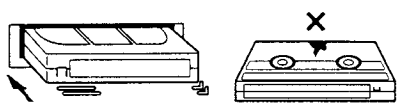
The indicator varies with the operating mode.

Ejecting a tape	⏏
Stop	■
Double speed playback Fast-forwarding Forward picture search	▶▶
Rewinding Reverse picture search	◀◀
Recording	●
Recording pause	❚❚●
Playback	▶
Still picture Frame advance	❚❚
Slow playback	❚▶

Note
In addition to the indication above, the VTR may display other indicators such as index search. See respective pages for each explanation.

Video Cassette Use

■ **Loading a Cassette**
Push the cassette into the cassette compartment with the window side facing up and the label side towards the front. The VTR is automatically turned on. The [OO] indicator will appear in the VTR display. C



■ **Ejecting a Cassette**
Press the **EJECT** button. The cassette is ejected from the cassette compartment. B

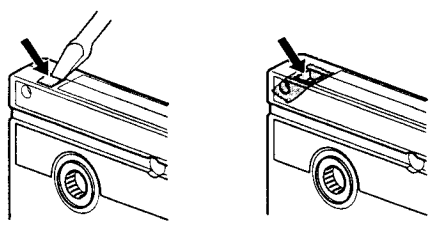
Warning
Do not insert your hands or any foreign objects into the compartment. This may result in injury or damage. Take special care with children to avoid accidents.

Precautions When Using Video Cassettes

Video cassettes have a safety tab to prevent accidental erasure. If the tab has been removed, recording cannot be performed.

■ **To prevent accidental erasure**
Remove this safety tab with a screwdriver.

■ **To record again**
Cover the tab hole with adhesive tape.



- Avoid exposing cassettes to direct sunlight. Keep them away from heaters.
  Avoid extreme humidity, vibrations or shock, strong magnetic fields (near a motor, transformer or magnet) and dusty places.

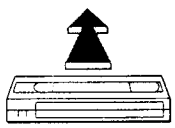
6. PLAYBACK

This section explains the basic playback operation.

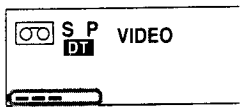
Playback

Preparation
Select the video channel or video input mode on the TV.

1 Load a recorded cassette. Power is turned on. If the cassette has no safety tab, playback starts automatically. C

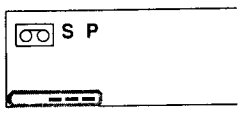


2 Press the **PLAY** button to start playback. 8 D

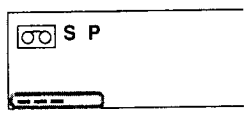


3 To stop playback, press the **STOP** button. 23 E

■ To rewind, press the **REW** button in the stop mode. 9 J



■ To fast-forward, press the **FF** button in the stop mode. 22 K



Note
TVs connected via SCART cables normally select the video input mode automatically when the PLAY button is pressed.

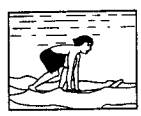
Playback and recording with the LP tape speed
When playback a tape that has been recorded on another VTR, it may happen that the picture colour disappears, the picture becomes unstable and that noise occurs. It is therefore recommended that tapes that have been recorded on this VTR also are played back on this VTR.

Adjusting the Tracking

■ **Digital Auto Tracking**
When playback starts, the VTR automatically adjusts the tracking for clear pictures and sound. The "DT" indicator blinks during the adjusting.

Notes
- During the adjusting, the playback picture and sound may be distorted.
- The digital auto tracking is activated only in the playback mode.

■ **Adjusting the tracking manually**
If the VTR cannot locate the best possible tracking point, hold down one of the **CH/TRK** buttons until you obtain the best possible picture and sound. 15



Notes 15 H
- To reset the tracking point to the center, press both the CH/TRK buttons simultaneously.
- To resume the digital auto tracking, hold down both the CHANNEL buttons on the VTR simultaneously for about 2 seconds.
- The noise on the screen may not be completely eliminated depending on the tape used, especially when the tape was recorded on another VTR.

7. RECORDING OF TV PROGRAMMES

This section explains the basic recording operation.

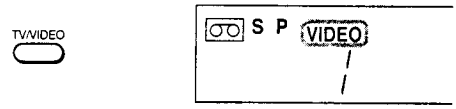
Recording a TV Programme

Preparation

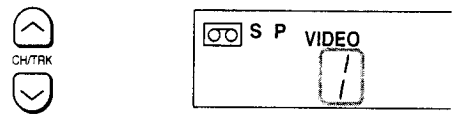
- Turn on the VTR.
- Select the video channel or video input mode on the TV.

1 Load a cassette with the safety tab attached. Ⓒ

2 Press the **TV/VIDEO** button so that the "VIDEO" indicator appears in the VTR display. 1

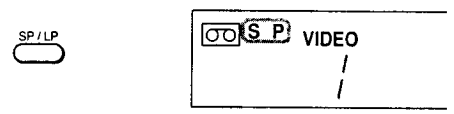


3 Select the TV programme (position number) to record with the **CHANNEL** buttons on the VTR, or the **CH/TRK** buttons or **number buttons** on the remote controller. Ⓗ 15



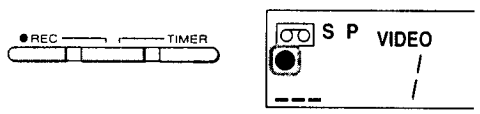
If "L" or "SA" is displayed in the VTR display, press the **INPUT SELECT** button so that the position number appears. 2

4 Press the **SP/LP** button to select the recording tape speed. 11



SP: Suitable for general recording with better picture and sound quality.
LP: Suitable for doubling recording time, but with less picture and sound quality than using the SP tape speed.

5 Press the **REC** button on the VTR, or simultaneously press the two **REC** buttons on the remote controller. Recording starts. Ⓘ 6



6 Press the **STOP** button to stop recording. 23 Ⓔ

Watching a TV Programme While Recording Another

1) While recording, press the **TV/VIDEO** button so that the "VIDEO" indicator if displayed disappears in the VTR display. 1

2) Choose another channel using the channel selector on the TV.

Note

To monitor the programme which is being recorded, press the TV/VIDEO button so that the "VIDEO" indicator will appear in the VTR display. Select the video channel or video input mode on the TV. 1

Skipping Unnecessary Scenes While Recording

Press the **PAUSE/STILL** button to stop recording momentarily. To resume recording, press the **PAUSE/STILL** button again. 21

Note

The VTR automatically shifts to the stop mode if the recording pause mode continues for 10 minutes.

8. VIDEO PLUS+ RECORDING

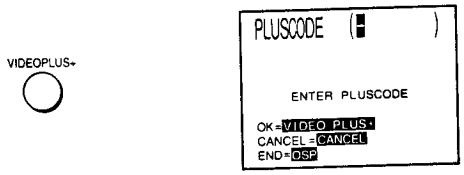
You can easily programme a recording simply by entering the PlusCode. The numbers are published in the TV listings of newspaper, TV guide magazine, etc.

Video Plus+ Recording

Preparation

- Turn on the VTR.
- Select the video channel or video input mode on the TV.
- Make sure that the clock is set correctly.
- Make sure that theTV stations have stored properly.

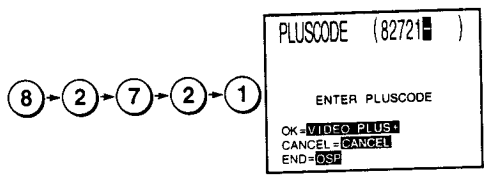
1 Press the **VIDEO PLUS+** button.
The VTR enters the Video Plus+ mode. **24**



2 Enter the PlusCode.

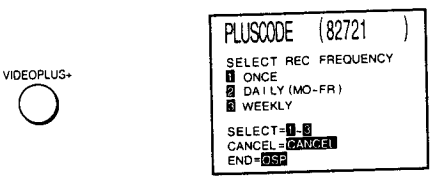
Example: To record a TV programme beginning at 21:30 on August 30, 1996 with PlusCode 82721 (fiction).

Press **number button 8, 2, 7, 2** and **1.**
Confirm that the entered number is correct. **3**



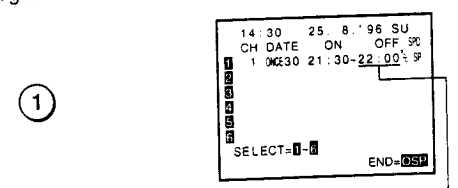
- To correct the number, clear all digits by pressing the **CANCEL** button and re-enter a number. **19**

3 Press the **VIDEO PLUS+** button.
The TV screen changes as follows: **24**



ONCE: One-time recording.
DAILY (MO~FR): Records TV programmes on the same TV channel at the same time Monday through Friday.
WEEKLY: Records TV programmes on the same TV channel at the same time on the same day every week.

4 To select "ONCE" for example, press **number button 1**. The "ONCE" programming has been made automatically.
Programme details are shown. **3**



Ex.If you set 10 minutes time extension on the OPTIONS screen (see below), "OFF" displays 22:10.

5 To change the tape speed, press the **SP/LP** button. **11**

6 Press the VIDEO PLUS+ button.
The programme setting is now memorized. **24**

7 To enter another PlusCode, repeat steps *2* to *6*.

8 Finally press the two **TIMER** buttons simultaneously. The VTR enters the timer standby mode and the ⏲ indicator lights up. **20**

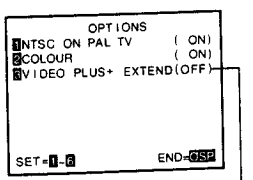
Setting Time Extension

Before making a Video Plus+ recording, set possible time extension for the recording to allow for programme's overrun. You can extend the recording time in 10 minute increments up to 60 minutes.

1) Press the **OSP** button to display the MENU screen. **18**

2) Press **number button 3** to select "OPTIONS". **3**

3) Press **number button 3** repeatedly to set desired time extension. **3**



OFF – 60 – 50 – 40 – 30 – 20 – 10

4) Press the **OSP** button twice to exit. **18**

Notes

- Extend time should be set before starting Video Plus+ recording procedure.
  The time extending doesn't work on recording programmes already memorized.
- When you do not use time extension for Video Plus+ recording, set to "OFF" on the OPTIONS screen.

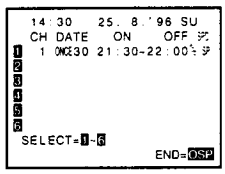
Confirming the Video Plus+ Timer Programme

■ **Before the VTR enters the timer standby mode (⏲ indicator not lit)**

1) Press the **OSP** button to display the MENU screen. 18

2) Press **number button 4** to select "PROGRAM". 3

④



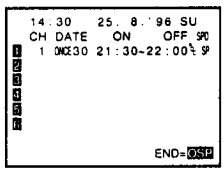
Check the programmed data.

3) Press the **OSP** button twice to exit. 18

■ **During the timer programme recording. (⏲ indicator lit)**

Press the **OSP** button. 18
The screen for confirming appears.

OSP



After about 30 seconds, the screen disappears.

Cancelling the Video Plus+ Timer Programme

1) If the ⏲ indicator is lit, press the two **TIMER** buttons to turn it off, and turn on the VTR by pressing the **ON/STANDBY**. 20 12

2) Press the **OSP** button to display the MENU screen. 18

3) Press **number button 4** to select "PROGRAM". 3

4) Select a program number which you want to cancel by using **number buttons**. 3

5) Press the **CANCEL** button. 19
The line is cleared out.

6) Press the **OSP** button. 18

Recording or Playback in the Timer Standby Mode

First press the two **TIMER** buttons to release the timer standby mode, and then press the **ON/STANDBY** button to turn on the VTR. The VTR will be available for use. 20 12

- Be sure to press the two **TIMER** buttons again to return the VTR to the timer standby mode after you operate. 20

If a power failure occurs during the timer programme recording

- If the ⏲ indicator is missing in the VTR display after the power failure, the programmed contents have been cleared. Reset the timer programming.
- When power has failed for a short time, the colon of the current time display blinks. The programmed contents are not affected. Reset the clock.

Error indicators

When the "FULL (CLEAR PROG?)" message appears on the TV during programming, no more programmes can be entered. If you want to add another programme, select one existing programme on the screen by using number buttons, and press the CANCEL button to delete it.

If impossible PlusCode is entered, "INVALID CODE ENTERED" or "INVALID DATE ENTERED"blinks on the screen to tell you that the recording cannot be performed. Press the CANCEL button to clear the PlusCode and enter correct one.

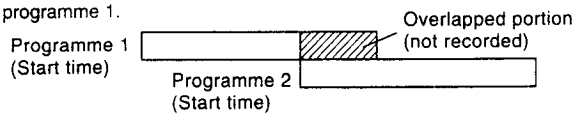
If "CLASH" message appears on the screen during programming, it tells you that two programmes with the same recording start time have been entered. You have to make a correction. On this screen, blinking item number means that the item has been entered later.

1) Enter the number of the programme you want to correct using **number buttons**.

2) Correct the timer programme data, or clear the data by pressing the **CANCEL** button and then press the **VIDEO PLUS+** button to enter the PlusCode.

Overlaps the programmes

If two programmes overlap, the recording start time of programme 2 has a priority over the recording end time of programme 1.



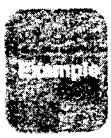
9. TIMER PROGRAMME RECORDING

The programmable timer allows you to record up to 6 different programmes over one month.

Timer Programming Procedure

Preparation

- Select the video channel or video input mode on the TV.
- Turn on the VTR.
- Make sure that the clock is set correctly.



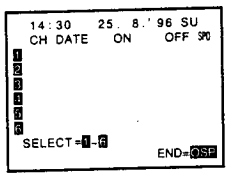
To record a programme of a station stored on position number 1 (e.g. BBC1) in the SP tape speed from 21:30 until 22:00 on August 30. Today is August 25.

1 Load a cassette with the safety tab attached. C

2 Press the **OSP** button to display the MENU screen. 18

3 Press **number button 4** to select "PROGRAM". 3

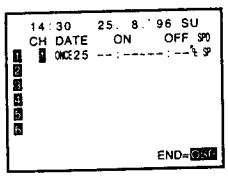
④



Programme number 1 is ready to accept your input.

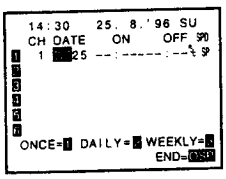
4 Select an empty programme number using **number buttons 1 to 6**. 3

①



5 To select position number 1, press **number button 0 and 1**. 3

0 → 1

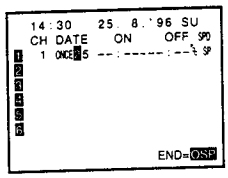


- If you record from the connected external equipment, make "L" or "SA" appear by pressing the **INPUT SELECT** button as follows: 2
  - L: Via the AUDIO/VIDEO (SCART) socket on the rear panel.
  - SA: From the satellite receiver connected to the SATELLITE (SCART) socket on the rear panel.

To make corrections:
Press the SHIFT (←) button to move back to the item, or the SHIFT (→) button to move forward. 16

6 Select a frequency of recording. (eg. once) 3

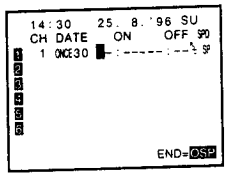
①



You can also set daily or weekly timer programme recordings. (See next page.)

7 Set the recording date. 3

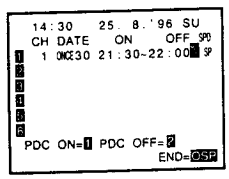
3 → 0



8 Set the recording start time and the off time. 3

2 → 1 → 3 → 0

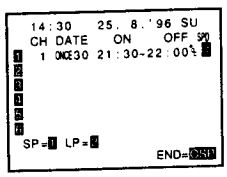
2 → 2 → 0 → 0



9 To set PDC, press **number button 1** : if not set, press **number button 2**. 3

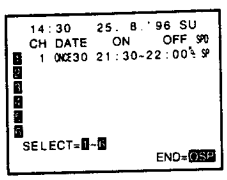
Note
If you have set the VTR to the satellite receiver control mode (SA displayed) in step *5*, PDC cannot be set.

①



10 Select the tape speed (SP). 3

①

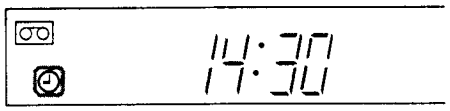


To set another programme, follow steps *4* to *10*. In step *4*, select next programme number.

11 Press the **OSP** button. 18

12 Press the two **TIMER** buttons simultaneously. 20

The power turns off and the VTR enters the timer standby mode.



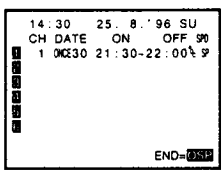
Daily and Weekly Recording

■ **Daily recording**
You can record TV programmes on the same channel at the same time Monday through Friday. Press **number button 2** for "DAILY" in step *6*. 3

■ **Weekly recording**
You can record TV programmes on the same channel on the same day and time every week. Press **number button 3** for "WEEKLY", then **number button 1** to **7** to select a day of the week in step *6*. 3

Confirming the Timer Programmes (During the Timer Programme Recording)

Press the **OSP** button. 18
The screen for confirming will appear.



After about 30 seconds, the screen disappears.

Changing/Cancelling the Timer Programmes

1) If the ⏲ indicator is lit, press the two **TIMER** buttons to turn it off, and then turn the VTR on by pressing the **ON/STANDBY** button. 20 12

2) With steps *2* to *11*, change the items. 19
   • To cancel a programme, select the programme number you want to cancel in step *4*, and press the **CANCEL** button. The line is then cleared.

3) Press the two **TIMER** buttons to return to the timer standby mode. 20

Recording or Playback in the Timer Standby Mode

First press the two **TIMER** buttons to release the timer standby mode, and then press the **ON/STANDBY** button to turn on the VTR. The VTR will be available for use. 20 12

• Be sure to press the two **TIMER** buttons again to return the VTR to the timer standby mode after you have finished. 20

Error Indication

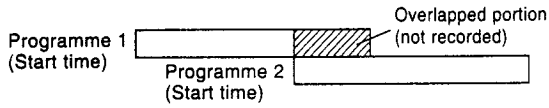
• The "E" (Error) indicator appears in the VTR display if you press the TIMER buttons when:
—a cassette is not loaded.
—the loaded cassette has no safety tab.
—no timer programme is set.
In these cases, a recording can not be made.

If a power failure occurs during the timer programme recording

• If the ⏲ indicator is missing in the VTR display after the power failure, the programmed contents have been cleared. Reset the timer programming.
• When power has failed for a short time, the colon of the current time display blinks. The programmed contents are not affected. Reset the clock.

Overlaps of the programmes

If two timer programmes overlap, the recording start time of programme 2 has priority over the recording off time of programme 1.



1

10. TAPE COUNTER

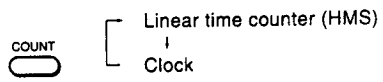
These functions will help your playback.

Counter Function

You can view the clock or linear time counter in the VTR display or on the TV screen.

Counter Displays

Each time you press the **COUNT** button, the VTR display changes in sequence as follows: 14



The indication above will also appear on the TV screen by pressing the **DISPLAY** button. They are switchable with the **COUNT** button. 4 14

To reset the linear time counter to "0H00M00S"
The counter is automatically reset to "0H00M00S" when a cassette is ejected. If you want to reset at another point, such as the beginning of a new recording, just press the **COUNTER RESET** button. 13

Notes

- The linear time counter does not work on non-recorded portions on the tape.
- When the tape is ejected or the VTR is turned off, the display changes to clock.
- If the tape rewinds back over "0H00M00S", "—" appears in the VTR display.
- The displayed time of the linear time counter is only an approximation.

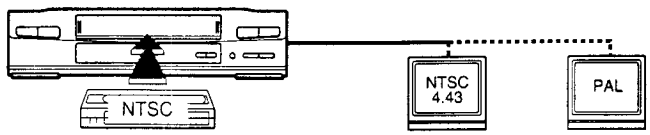
11. NTSC-RECORDED TAPE PLAYBACK

This VTR can play back an NTSC-recorded tape. You can watch the playback picture on a PAL system TV or an NTSC 4.43 system TV.

Setting for NTSC Playback

When you play back an NTSC-recorded tape on this VTR, make a setting on the OPTIONS screen according to your TV.

NTSC Tape: tapes on which NTSC M system broadcasts mainly broadcast in the U.S. and Japan are recorded, and tapes recorded in the NTSC video system which are commercially available on the market.

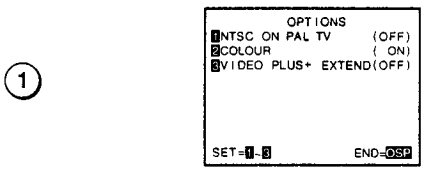


Multi System TV (NTSC 4.43 compatible)

1 Press the **OSP** button to display the MENU screen. 18

2 Press **number button 3** to select "OPTIONS". 3

3 Set "NTSC ON PAL TV" to "**OFF**" by pressing **number button 1**. 3



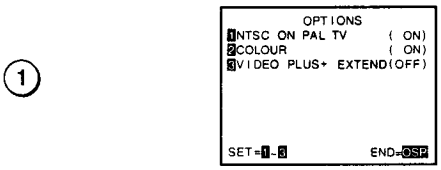
4 Press the **OSP** button twice to exit. 18

PAL System TV

1 Press the **OSP** button to display the MENU screen. 18

2 Press **number button 3** to select "OPTIONS". 3

3 Set "NTSC ON PAL TV" to "**ON**" by pressing **number button 1**. 3



4 Press the **OSP** button twice to exit. 18

Note

With this VTR, an NTSC tape recorded in the SLP tape speed can be played back. But there are some points to be observed.

- The quality of the playback picture and sound are not clear.
- Variable speed playback (picture search, still, slow playback, etc.) can't be performed properly.
- Digital auto tracking may not be performed properly.

Notes for Using a PAL TV for NTSC Playback

- Use a TV compatible with PAL video signals of PAL 60 (525 lines).
  When the TV, that is not compatible with PAL video signals of PAL 60, is used (when the TV, that is compatible only with PAL video signals of PAL 50 (625 lines), is used) NTSC playback pictures may roll up and down. This is not malfunction of the VTR or the TV.
  If your TV is equipped with a V-HOLD control, it may be possible to stop the rolling of pictures by adjusting this control.
  About PAL 50 and PAL 60 of PAL video signals:
  PAL 50 : is a normal signal and its PAL video signal is 50 fields (625 lines).
  PAL 60 : is a special signal and its PAL video signal is 60 fields (525 lines).
  Some TVs operate properly only with PAL 50 signals, some TVs operate properly with both PAL 50 and 60 signals.
  Therefore, if your TV is switchable between PAL 50 (625 lines)/PAL 60 (525 lines), you can view an NTSC recorded tape in the PAL colour system with your own TV.
- Depending on the TV used, the picture may shrink vertically and black bars may appear both at the top and bottom of the TV screen. This is not an indication of malfunction.
- Variable speed playback (picture search, still, slow playback, etc.) may produce a skewed image and quite a bit of noise on the picture.
- If the tape pre-recorded in the SP tape speed mode is played back in the picture search mode, the picture may be reproduced with no colour.

Note

For viewing an NTSC-recorded tape, we recommend using an NTSC 4.43 TV.

12. VARIABLE SPEED PLAYBACK

You can play back a tape at various tape speeds.

Picture Search

You can locate a particular scene while viewing a playback picture in the fast-forwarding or rewinding mode.

1 During playback, press the **REW** or **FF** button. 9 22
The tape runs at 5 times the normal playback speed.

Playback ⇨ (REW ◀◀) to reverse picture search (5 times)

Playback ⇨ (FF ▶▶) to forward picture search (5 times)

2 If you continue to press and hold the **REW** or **FF** button, the search speed increases. 9 22

Hold down.
Reverse picture search (5 times) ⇨ (REW ◀◀) To reverse picture search (13 times)

Forward picture search (5 times) ⇨ (FF ▶▶) To forward picture search (13 times)
Hold down.

When you release the button, the speed returns to 5 times.

3 To resume normal playback, press the **PLAY** button. 8 D

(PLAY ▶)

Notes
- The picture will have some interference. This is not a defect in the unit.
- If you play back a tape recorded in the LP tape speed or recorded on another VTR in various speed mode, the picture may be noisy or monochrome.
- If you press the REW or FF button while rewinding or fast-forwarding the tape, the VTR enters the picture search mode. 9 22
  If you press the REW or FF button while picture searching, the VTR enters the rewinding or fast-forwarding mode, respectively. 9 22

Still Picture

You can freeze a picture to watch closer.

1 During playback, press the **PAUSE/STILL** button. 21
The picture freezes.

Playback ⇨ (PAUSE/STILL ❚❚) to still picture

2 To resume playback, press the **PAUSE/STILL** button again. 21

Still picture ⇨ (PAUSE/STILL ❚❚) to normal playback

The still mode is automatically cancelled after about 5 minutes and returns to normal playback.

Notes
- The still picture may shake if a picture of a fast-moving object or scene is frozen. This is not a defect in the unit.
- If you play back a tape recorded in the LP tape speed or recorded on another VTR in various speed mode, the picture may be noisy or monochrome.
- If noises appear in the still picture, adjust the tracking manually in the slow-motion mode. (See next page.)

Adjusting Still Picture Stability

If the still picture is distorted or flickers, hold down one of the **CH/TRK** buttons until the picture becomes stable. 15

(CH/TRK ▲ ▼)

Note
The distortion of the still picture may not be eliminated completely.

Frame Advance

You can advance the picture frame by frame.

1 During playback, press the **PAUSE/STILL** button. 21

(PAUSE/STILL ❚❚)

2 Press the **PLAY** button. 8 D
Each time you press the button, the picture advances one frame.
While the button is held down, the tape runs at 1/25th the normal playback speed.

3 To resume normal playback, press the **PAUSE/STILL** button. 21

Slow-motion Picture

You can playback at 1/6th or 1/12th the normal playback speed.

1 During playback, press the **SLOW** button. 7
The tape will run at about 1/6th the normal playback speed.

2 If you press the **SLOW** button again, the speed changes to 1/12th. 7
Each time you press the button, the speed changes between 1/6 and 1/12.

3 To resume normal playback, press the **PLAY** button. 8 D

The slow-motion picture mode will be cancelled automatically after approximately 5 minutes to shift to the normal playback mode.

Note
The slow-motion picture may flicker up and down. This is not a defect in the unit.

Adjusting the Tracking Manually

If the slow-motion picture is noisy, hold down one of the **CH/TRK** buttons until the best picture is obtained. 15

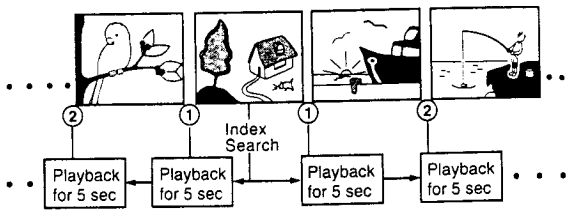
Note
The noise in the slow-motion picture may not be eliminated completely by the tracking adjustment.

13. INDEX SEARCH / SKIP SEARCH

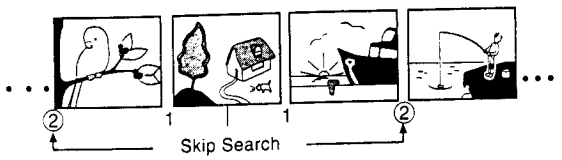
You can easily locate the desired programme using the index signal registered on the tape.

About This Function

Index Search
The VTR plays back each programme with an index signal for about 5 seconds.



Skip Search
The VTR finds and plays back a programme with an index signal you specified.



To use this function, index signals have to be registered on your tape. For registering index signals, follow the procedure below.

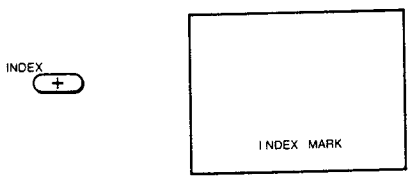
Registering Index Signals

■ **Registering index signals automatically**
An index signal is automatically registered **when a recording starts.**

Notes
- An index signal is not registered when the VTR is in the recording pause mode and recording restarts.
- An index signal is also registered when a timer programme recording starts.

■ **Registering index signals manually**
Index signals can be manually registered at desired points on the tape **during recording.**

Press the **INDEX** (+) button at a desired point. **5**



Note
When registering two or more index signals, certain intervals are required: more than 1 minute in the SP tape speed and more than 2 minutes in the LP tape speed.

Index Search

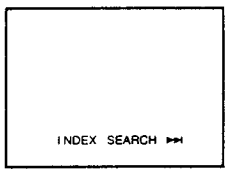
This function plays back the tape for about 5 seconds at each index signal.

1 Load a cassette with the index signals registered. C

2 Press the **INDEX** (–) or (+) button in the stop or playback mode. 5

INDEX (–) : to search in the reverse direction

INDEX (+) : to search in the forward direction



The VTR fast-forwards or rewinds the tape. When an index signal is found, the VTR plays back the tape for about 5 seconds, and then resumes fast-forwarding or rewinding. This is repeated each time at an index signal.

3 Press the **PLAY** button when the desired programme is found. 8 D
Normal playback starts.

PLAY ▶

Notes
- At the very beginning of the tape, the index search function may not work properly.
- If you registered the index signals on a tape recorded on another VTR, the recording may be blurred at the index point and the index search may not work properly.

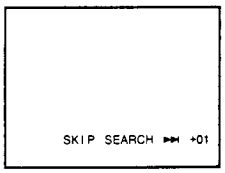
Skip Search

This function fast-forwards or rewinds the tape to the point at which the selected index signal is registered, and starts playback from there.

1 Load a cassette with the index signals registered. C

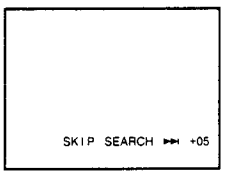
2 Press the **INDEX** (–) or (+) button twice in the stop or playback mode. 5

INDEX (–) (+)



3 Press the **INDEX** (–) or (+) button depending on the direction where your desired programme is located. 5
Each time you press the (–) or (+) button, the number decreases or increases respectively.

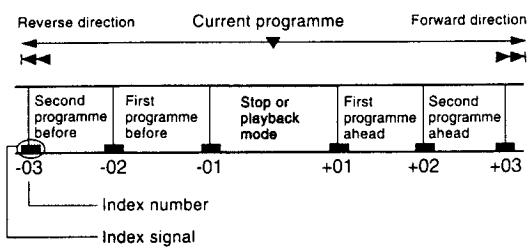
INDEX (–) (+)



The VTR starts to search for the point you specified with the (–) or (+) button. When the point is found, playback will start automatically.

Notes
- You can set an index number up to ±20.
- The skip search is cancelled when the PLAY or STOP button is pressed.

Locating the Index Number

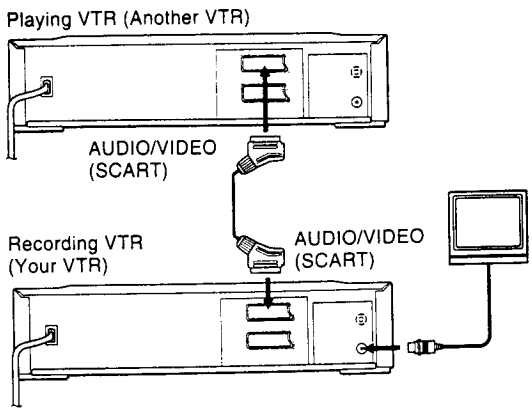


[Example]
- To locate the beginning of first programme before, press the **INDEX** (–) button three times to set the index number -02. 5
- To locate the beginning of next programme ahead, press the **INDEX** (+) button twice to set the index number +01. 5

14. TAPE COPYING

Using another VTR or external equipment, you can copy a tape.

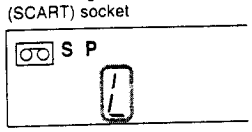
Tape Copying



Important
It is permissible to record television programmes only in the event that third party copyrights and other rights are not violated.

1 Press the **INPUT SELECT** button so that the VTR display shows "L" depending on your connection. **2**

When using the AUDIO/VIDEO (SCART) socket



2 Press the **SP/LP** button to select the recording tape speed. **11**

3 Play the tape on the playback VTR and press the **REC** buttons to start recording on this VTR. **6** **I**

4 Press the **STOP** button on each VTR when copying is finished. **23** **E**

Notes
- The picture quality of the copied tape is slightly less than the original picture quality.
- When monitoring a picture being recorded, press the TV/VIDEO button to make the "VIDEO" indicator appear in the VTR display and select the video channel on the TV. **1**

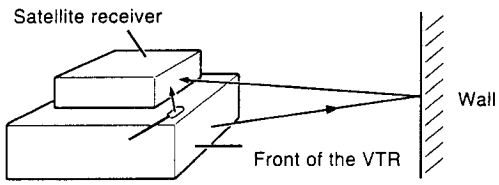
15. CONTROL OF SATELLITE CHANNELS

Your satellite channels can be selected or changed on this VTR via the connected satellite receiver, same as TV channels.

Setting to Control Satellite Channels

You can select satellite channels by operating this VTR.
It is also possible to automatically change the satellite channels according to your programme setting in the timer programme recording.

Important
Put the satellite receiver on the top of the VTR as shown below. Do not block the sensor window.



The infrared signals come out of the sensor window and the front of the VTR. Then they bounce off walls and other objects in the room and are received by the satellite receiver. The VTR sends out infrared signals to your satellite receiver even during timer programme recording.

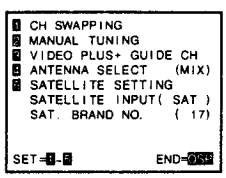
Note
If the channels cannot be controlled properly because the infrared signal fails to reach the satellite receiver, change the position of the satellite receiver on the VTR so that it can receive the signal.

Preparation
- Keep the connected satellite receiver turned on.
- Make sure your satellite receiver is connected to the VTR correctly.
- Select the video channel or video input mode on the TV.

1 Press the **OSP** button to display the MENU screen. **18**

2 Press **number button 5** to select "TUNING AND SATELLITE". **3**

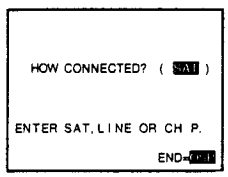
(5)

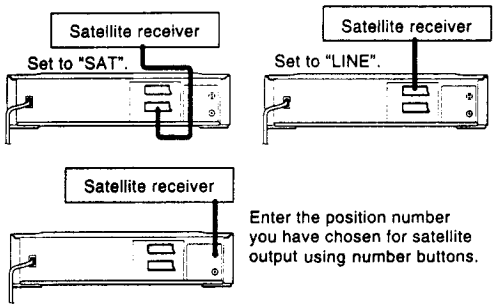


3 Press **number button 5** to select "SATELLITE SETTING". **3**

4 Set the position number or line input mode using the **INPUT SELECT** button depending on your satellite receiver connection. **2**

INPUT SELECT





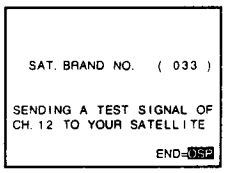
Enter the position number you have chosen for satellite output using number buttons.

5 Press the **OSP** button. **18**

6 Enter three figures of the brand code for your satellite receiver by **number buttons**. **3**
Check the brand code list.

Ex. To enter brand code 33.

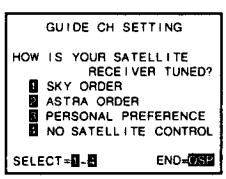
(0) → (3) → (3)



When you enter the brand code, the VTR sends a test signal to the satellite receiver to make sure that the brand code has been entered correctly. The signal will set the satellite channel to 12. If channel 12 is displayed on your satellite receiver, it means the brand code is set correctly.
Several codes may be allocated to one brand. Enter one after the other until the channel shows 12.

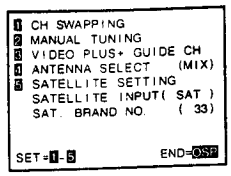
7 Press the **OSP** button. **18**

8 Select 1 to 4 using **number buttons** as below depending on your satellite receiver. **3**



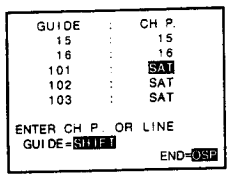
Select . . .
1: If the channel of SKY ONE is 1. } Refer to the "GUIDE Channel Table".
2: If the channel of SKY ONE is 8. }
3: If the order is personal choice.
4: If your satellite receiver did not change to channel 12 in step *6*.

If 1, 2 or 4 is selected, the screen changes as right after a few seconds.



→ Proceed to step *9*.

If you selected 3, the screen changes as below. It is necessary to make the setting of the GUIDE channels on this screen.
Follow steps from *4* on page 29 to set "CH P." column for all your satellite channels.



→ After having done the GUIDE channel setting, proceed to step **9**.

9 Press the **OSP** button twice to exit. 18

Controlling Satellite Channels

■ Using the remote controller of this VTR

1) Press the **SAT.CONT.** button to make "SAT" appear in the VTR display. 25

2) Select a desired satellite channel using **number buttons**. 3 17
Way of use may differ. Check how they work on your satellite receiver.

Ex. To select channel 3:
- 0→3
- 0→3→ENTER
- ENTER→3

To select channel 16:
- 1→6
- 1→6→ENTER
- ENTER→ENTER→1→6

Important
Some satellite receivers may not respond to all the operations above, or may not be operated at all with this remote controller. In this case, operate your satellite receiver with its own remote controller.

Notes 25
- Each time the SAT.CONT. button is pressed, this function goes on or off. 2
- To make a position number appear in the VTR display after you have cancelled this function, press the INPUT SELECT button.

■ Changing satellite channels automatically in the timer programme recording

25 3
When timer recording programming, press the **SAT.CONT.** button to display [SA] on the screen, and then enter a desired satellite channel using **number buttons**.
Go through steps **1)** and **2)** above beforehand and confirm that channels are properly selected.

Note
Keep the satellite receiver turned on even while the VTR is in the timer programme recording.

Table of Satellite Receiver Brand Codes

Brand name	Brand code
TOSHIBA	17, 33
ALBA	1, 2, 9, 16, 17, 65, 66
AMSTRAD	3, 4, 5, 17, 55, 56, 76, 77, 89, 90, 91, 124
ARMSTRONG	17, 43
BIG BROTHER	7, 8, 17
BT	17, 122, 123
BUSH	2, 9, 16, 17, 65, 66
CABLE STAR	17, 101, 102, 103, 104
CABLETIME	17, 101, 102, 103, 104
CAMBRIDGE	17, 122, 123
CHANNEL MASTER	2, 3, 10, 17
D2MAC DECODER	17, 72
DRAKE	17, 45
ECHOSTAR	13, 14, 17, 92, 93, 94
FERGUSON	9, 15, 16, 17, 23, 38, 39, 59, 108
GRUNDIG	17, 19, 28, 71, 125
ITT/NOKIA	17, 26, 27, 50, 51, 52
JVC	17, 122, 123
LENCO	17, 49
MASPRO	17, 20, 64, 67
MATSUI	17, 125
NEC	17, 22, 57
NETWORK	9, 16, 17
NORDMENDE	17
PACE	9, 16, 17, 23, 38
PANASONIC	17, 61
PHILIPS	16, 17, 24, 46, 73
REDIFFUSION	17, 25
REVOX	17, 21
SAKURA	17, 62, 63, 68
SALORA	17, 26, 27, 50, 51, 52
SAMSUNG	17, 36
SIEMENS	17, 23
SENTRA	10, 17
SONY	17, 30
TATUNG/NIKKO	17, 32, 54, 58, 80, 81
TEXSCAN	17, 119, 120
THOMSON	7, 17, 39
TRISTAR	17, 31
UNIDEN	17, 67
VIDEOTRON	17, 105, 106, 107, 108, 109, 110, 121
WISI	17, 35, 37, 44, 93

- For some brands, several brand codes are allocated.
- Some satellite receivers may not be operated at all with this VTR.

16. RECORDING FROM A SATELLITE RECEIVER

If you are using a satellite receiver, you can connect it to this VTR to record a satellite programme.

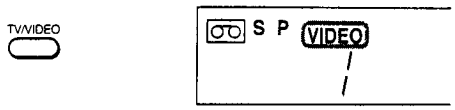
Recording Procedure

Preparation

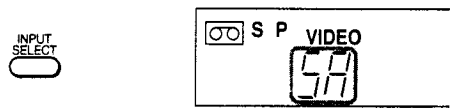
- Turn on the VTR.
- Select the video channel or video input mode on the TV.
- Make sure your satellite receiver is connected to the VTR correctly using a SCART cable, and turn it on.

1 Load a cassette with the safety tab attached. C

2 Press the **TV/VIDEO** button so that the "VIDEO" indicator appears in the VTR display. 1



3 Press the **INPUT SELECT** button so that "SA" indicator appears in the VTR display. 2

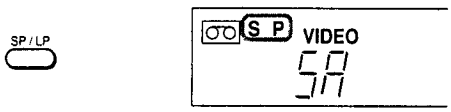


Each time you press the **INPUT SELECT** button, the display changes as follows. 2

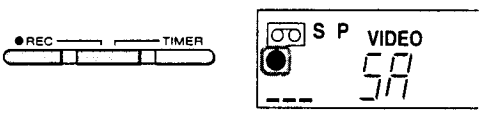
→ TV (position number)→ L → SA (satellite)

4 Select the desired satellite channel on the connected satellite receiver.
Make sure that the selected channel is on the TV.

5 Press the **SP/LP** button to select the recording tape speed. 11



6 Press the **REC** button on the VTR, or simultaneously press the two **REC** buttons on the remote controller. I 6
Recording starts.



7 Press the **STOP** button to stop recording. 23 E

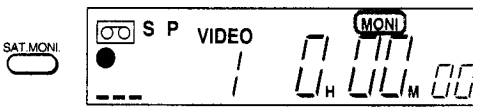
Satellite Monitor Function

You can watch a satellite programme from your connected satellite receiver even while the VTR is recording a TV programme, or is in the playback or stop mode.

Important
This function only applies when the TV and the satellite receiver are connected to the VTR using the SCART socket.

■ Watching a satellite programme while recording a TV programme

1) While recording a TV programme, press the **SAT.MONI.** button. 10
The "MONI" indicator appears.



Each time you press the **SAT.MONI.** button, the indicator goes on or off. 10

2) Choose a desired satellite channel on the connected satellite receiver.

■ Watching a satellite programme while the VTR is in the playback or stop mode

1) Press the **SAT.MONI.** button so that the "MONI" indicator appears in the VTR display. 10

2) Press the **TV/VIDEO** button so that the "VIDEO" indicator appears in the VTR display. 1

3) Choose a desired satellite channel on the connected satellite receiver.

Notes

- If you make the on-screen display (ex. MENU screen) appear on the TV, this function is cancelled.
- The satellite monitor function is also available in the timer programme recording mode.

■ Watching a TV programme while recording a satellite programme

1) While recording a satellite programme, press the **TV/VIDEO** button so that the "VIDEO" indicator disappears in the VTR display. 1

2) Choose a desired TV channel on the TV.

17. VIDEO PLUS+ RECORDING OF SATELLITE PROGRAMMES

You have to set the guide channel to record a satellite channel by Video Plus+.

GUIDE Channel Setting for Satellite Channels (Using a Satellite Receiver)

The VTR generally does this setting during "Setting to Control Satellite Channels" procedure. Use this procedure to correct the GUIDE channels or to make the GUIDE channel setting if your satellite receiver has a channel order other than SKY or ASTRA.

Preparation

- Select the video channel or video input mode on the TV.

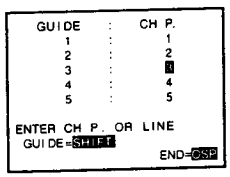
To set a GUIDE channel 101 of SKY ONE.

1 Press the **OSP** button to display the MENU screen. 18

2 Press **number button 5** to select "TUNING AND SATELLITE". 3

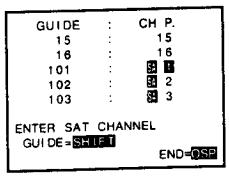
3 Press **number button 3** to select "VIDEO PLUS+ GUIDE CH". 3

(3)



4 Scroll the numbers to put 101 in the center position of the "GUIDE" column using the **SHIFT** button. 16

SHIFT



Refer to the chart you prepared.

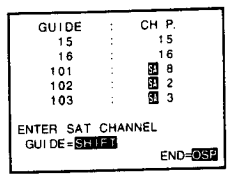
Satellite stations	GUIDE	Channel on your satellite receiver	
		*A	*B
SKY ONE	101	1	8
SKY NEWS	102	2	12
SKY MOVIES	103	3	16
THE MOVIE CHANNEL	104	4	18
SKY SPORT	105	6	20
NICKELODEON / NICK AT NIGHT	106	7	46
PARAMOUNT	106	7	46
EUROSPORT	107		
GALA VISION			
	144		
	145		
DISNEY CHANNEL	148	5	26
T.N.T./CARTOON NETWORK	149	17	37

*A is typical SKY order. *B is ASTRA TRANSPONDER order.

5 Press the **SAT. CONT.** button (SA displayed), and enter a channel number on the satellite receiver using **number buttons**. 25 3

If SKY ONE is channel 8 on your satellite receiver channel selector . . .

SAT.CONT → (0) → (8)



6 To set GUIDE channels for other satellite channels, repeat steps *4* and *5*.

7 Press the **OSP** button three times to exit. 18

Now you can make Video Plus+ recordings of satellite channels.

18. MANUAL SET UP

The manual procedure of Auto Set Up will help an additional TV station storing or clock resetting, etc.
This VTR can store up to 48 positions for TV stations.

Reset-Up Automatically

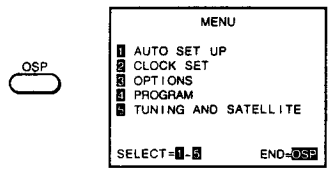
Use this proccedure if the Auto Set Up needs to be made again, for example, after a power failure, when plugged off, or in the event of receiving stations change.

Preparation

- Turn on the TV, and select the video input mode or video channel if you made the aerial connection.
- If your satellite receiver is connected using an RF lead, select SKY ONE on the satellite receiver. Auto set-up will allocate position number 6 on the VTR for the satellite output.

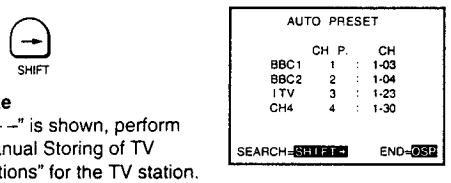
1 Press the **ON/STANDBY** button to turn on the VTR. 12 A

2 Press the **OSP** button to display the MENU screen. 18



3 Press **number button 1** to select "AUTO SET UP". 3

The VTR starts the automatic TV station storing and clock setting if you press the **SHIFT** (→) button. 16



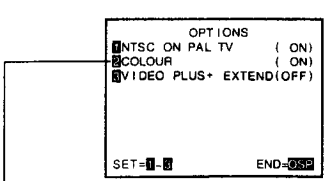
Note
If "– –" is shown, perform "Manual Storing of TV Stations" for the TV station.

4 Press the **OSP** button twice to return to the normal TV screen. 18

Note
If the time of the clock is not correct after this procedure, perform "Clock Setting" on this page.

Optional Settings on the OPTIONS Screen

If you press **number button 3** while the MENU screen is displayed, the screen turns to the OPTIONS screen. For details on each item, refer to pages respectively as below. 3



Press **number button 2** to select "OFF", if the TV programme or the tape is monochrome. 3

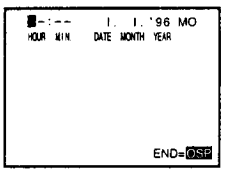
Clock Setting

The item to be set blinks. You can change the position by pressing the SHIFT buttons. 16

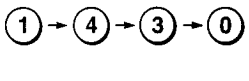
To set the clock to 14:30 on August 25, 1996

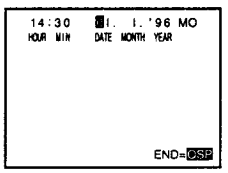
1 Press the **OSP** button. 18
The MENU screen appears on the TV.

2 Press **number button 2** to select "CLOCK SET". 3

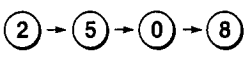


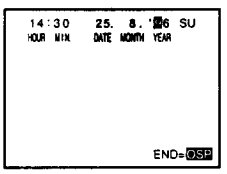
3 Set the hours and minutes. (24 hours clock format) 3



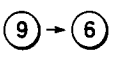


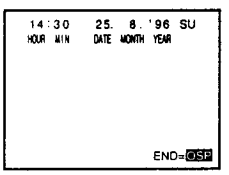
4 Set the day and month. 3



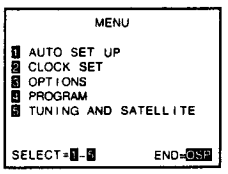


5 Set the year with its last two digits. 3





6 Press the **OSP** button. 18
Now the clock starts.



7 Press the **OSP** button again to exit. 18

Manual Storing of TV Stations

Information

Each TV station operating in the U.K. (e.g. BBC1, ITV) broadcasts on a unique frequency, which in turn has been allocated a transmission channel number (21 – 69). However, this unique frequency and corresponding number changes for each TV station from area to area. For example, BBC1 in London uses channel number 26, while in Oxford BBC1 uses channel number 57 (i.e., CH57). This VTR will indicate these channel numbers (1 – 9, 21 – 69) during tuning.

Preparation

- Select the video channel or video input mode on the TV.
- Turn on the VTR.
- If you use a satellite receiver, make the connection correctly and turn it on.

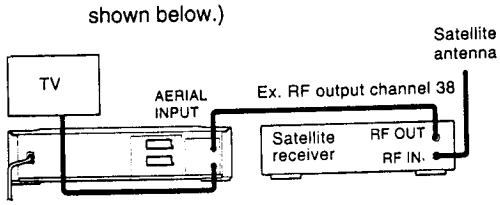
12

To store BBC1 to position number 1 on your VTR.

Allocation of the TV stations into the memory of the VTR is expected to be as follows, for Video Plus+ recording.

BBC1: Position number 1
BBC2: Position number 2
ITV: Position number 3
CHANNEL 4: Position number 4
CHANNEL 5: Position number 5 (From 1997)

Satellite: Position number 6, example (if connected by an RF lead only as shown below.)



In this case, select position number 6 in step *4*, and channel 38 in step *5* if the output channel of your satellite receiver is 38, for example. Make sure that TV receives a satellite broadcast. Whenever you watch or record a satellite programme, select position number 6.

Important

This procedure can be performed only when the VTR display shows a position number on the VTR. If the "L" or "SA" is displayed, press the INPUT SELECT button so that the position number appears.

2

INPUT SELECT

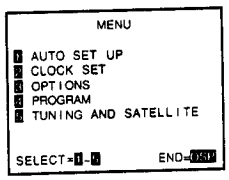
L ⇨ SA ⇨ 4

Position number

1 Press the **OSP** button.

18

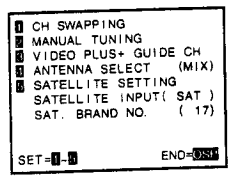
OSP



2 Press **number button 5**.

3

(5)

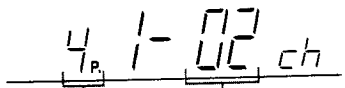


3 Press **number button 2** to select "MANUAL TUNING".
The VTR is now in the tuning mode, and the screen display disappears.

3

(2)

VTR display Example

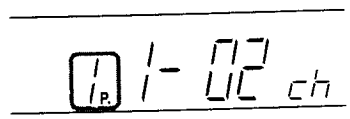


Position number — TV channel number (any No. of 1 – 9, 21 – 69)

4 Press the **CH/TRK** button to select position number 1.

15

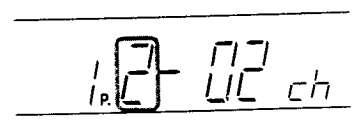
CH/TRK



5 Press **number button 6** to select a tuning range number.
Each time you press the button, the number changes.

3

(6)

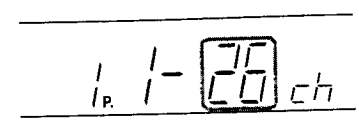


6 Press and hold the **SHIFT** button to start searching for BBC1.

16

Higher numbered channel

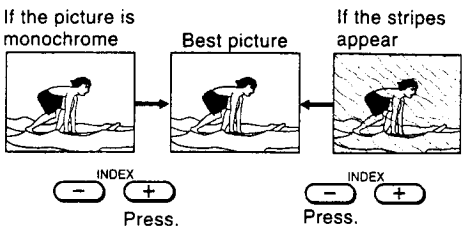
SHIFT



Lower numbered channel

If the received TV signal is not BBC1, press and hold the **SHIFT** button again.

7 If a clear picture does not appear on the TV screen after searching is finished, make fine adjustment with the **INDEX** buttons. **5**



8 Repeat steps *4* to *6* for other TV stations, and for satellite stations if your satellite receiver is not connected by a SCART.

Record all position numbers you stored on the VTR in the chart (GUIDE Channel Table) below so that you will be ready to use the Video Plus+ recording.

9 Press the **OSP** button. **18**
Channel tuning is now finished.

Once station storing is done, you can select a TV programme by the position number on which the TV station is stored.

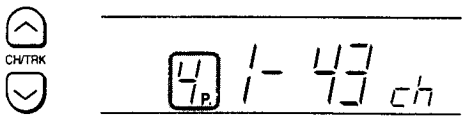
Skipping Channels

You can prevent the use of certain position numbers.

1) Set the VTR to the tuning mode following steps *1* to *3* of the station storing procedure.

2) Select the position number you want to skip with the **CH/TRK** button. **15**

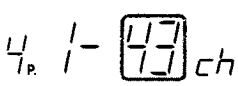
Example **To skip position number 4.**



3) Press **number button 3**. **3**
The following indication will appear in the VTR display with the skip function on or off.

(3)

Skip function off



Skip function on

If you press **number button 3** again, the TV channel number will appear and the skip function will be cancelled. **3**

4) Press the **OSP** button to exit. **18**

To cancel channel skipping
Follow steps **1)** to **4)** above.

GUIDE Channel Table

TV stations	GUIDE	Position number in which the TV station has been memorized on the VTR.
BBC1	001	1
BBC2	002	2
ITV	003	3
CHANNEL 4	004	4
RTE (IRELAND)	005	
NETWORK 2 (IRELAND)	006	

Satellite stations	GUIDE	Channel on your satellite receiver	
		*A	*B
SKY ONE	101	1	8
SKY NEWS	102	2	12
SKY MOVIES	103	3	16
THE MOVIE CHANNEL	104	4	18
SKY SPORT	105	6	20
NICKELODEON	106	7	46
PARAMOUNT	106	7	46
EUROSPORT	107	19	4
GALA VISION	108		
MTV EUROPE	109	14	15
CHILDREN'S / FAMILY CHANNEL	110	10	35
SKY MOVIES GOLD	111	20	60
BBC WORLD SERVICE	112		
RTL 4	113		
FILMNET 2 / FILMNET +	114		
RTL PLUS INTERNATIONAL	115		
SAT 1	116		
PREMIERE	117		
3 SAT	118		
ARD	119		
PRO 7	120		
TELE 5	121		
TELECLUB	122		
UK GOLD	123	11	23
DISCOVERY / THE LEARNING CHANNEL	124	9	41
BRAVO	125	8	42
EUROPEAN BUSINESS NEWS	125	8	42
CNN	126	29	28
EURONEWS	127		
QVC	129	12	38
UK LIVING	130	13	34
RAI 1	131		
RAI 2	132		
TV5 EUROPE	133		
TVE INTERNATIONAL	134		
MBC/ARABIC	135		
VTM	136		
SPORTNET	137		
CMT EUROPE	138	17	24
VIDEO HITS ONE	139	15	22
SKY SPORT 2 / SKY SOAPS / SKY TRAVEL	140	16	47
THE HISTORY CHANNEL	140	16	
SCI-FI CHANNEL	140	16	
SKY SPORTS GOLD	140	16	
TV ASIA	141		
LA-5	142		
LIVE TV	143		
SUPERCHANNEL	144	28	50
JAPAN TV	145	17	24
SELECT TV	146		
MOVIE CHANNEL / FILMNET 1	147	35	63
DISNEY CHANNEL	147	5	26
T.N.T./CARTOON NETWORK	149	18	37

*A is typical SKY order. *B is ASTRA TRANSPONDER order.

GUIDE Channel Setting for TV Channels Manually

Video Plus+ is a timer recording system for an easier programming that requires you only to enter a PlusCode assigned to a desired programme. This section explains the necessary set-up to make Video Plus+ recordings.

Information

You can perform timer recording very easily using the Video Plus+ programming system of this VTR. Before making a Video Plus+ recording, it is necessary to set GUIDE channels in the VTR.

- Clock Setting
- Manual Storing of TV Stations
- Setting to Control Satellite Channels (When using a satellite receiver)
  - Satellite input setting
  - Brand code setting
  - GUIDE channel setting

    GUIDE channels for satellite channels are automatically set when you choose SKY or ASTRA. If you correct the setting, or if your satellite receiver is not SKY or ASTRA, use the procedure explained in "Video Plus+ SET-UP".
- Video Plus+ SET-UP (GUIDE Channel Setting)
  - GUIDE Channel Setting for TV Channels
  - GUIDE Channel Setting for Satellite Channels
- Video Plus+ RECORDING

Important

There is no need to perform this procedure if the TV stations have been stored to the position numbers (1 for BBC1, 2 for BBC2, 3 for ITV and 4 for CHANNEL 4) on the VTR.

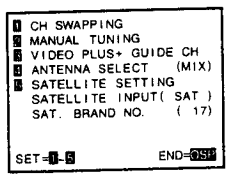
Preparation

- Select the video channel or video input mode on the TV.

1 Press the **OSP** button to display the MENU screen. 18

2 Press **number button 5** to select "TUNING AND SATELLITE". 3

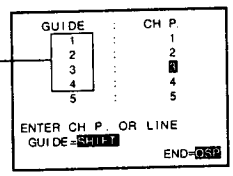
(5)



3 Press **number button 3** to select "VIDEO PLUS+ GUIDE CH". 3

(3)

GUIDE channels
1: BBC1
2: BBC2
3: ITV
4: CHANNEL 4
7: CHANNEL 5



GUIDE channels 1 to 4 have been factory set to position numbers 1 to 4 respectively. Make sure that the numbers are matched as above.

Note

To set another TV channel, select the GUIDE channel using the SHIFT button, and in the "CH P." column enter the position number in which you have stored the TV station by number buttons. 16 3

4 Press the **OSP** button three times to exit. The GUIDE channel setting for TV channels is complete. 18

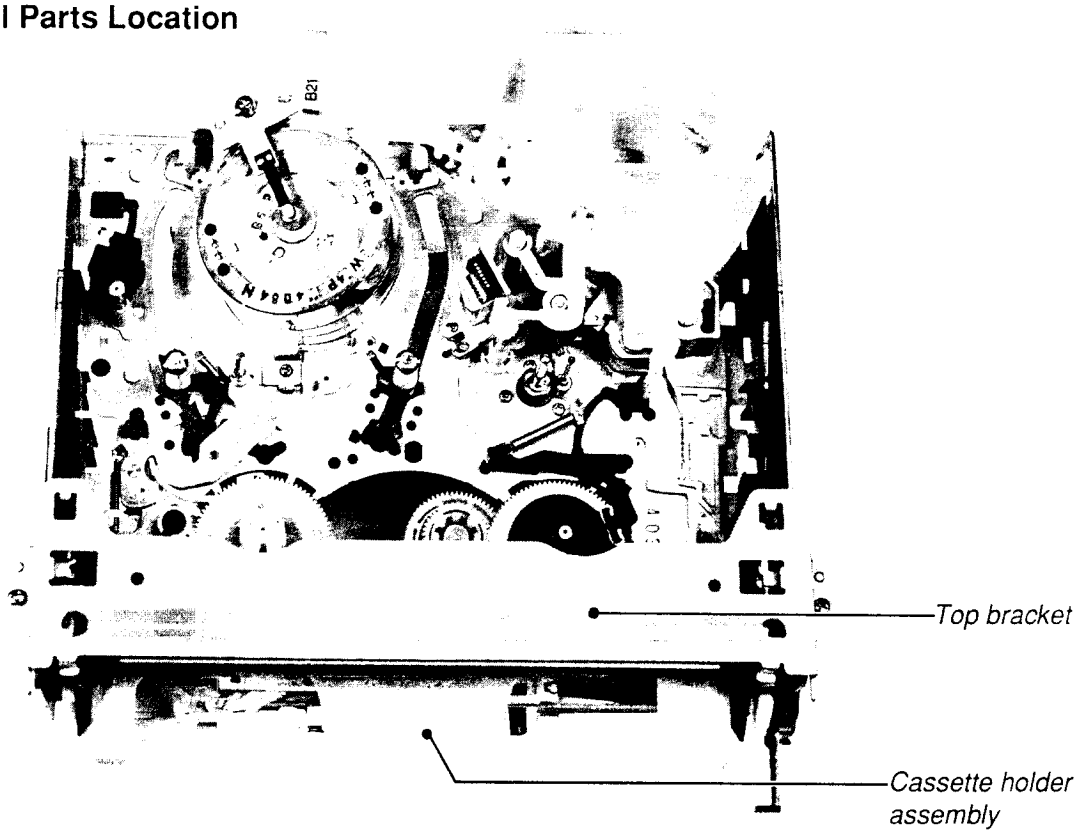
Now you can make a Video Plus+ recording of TV programmes.

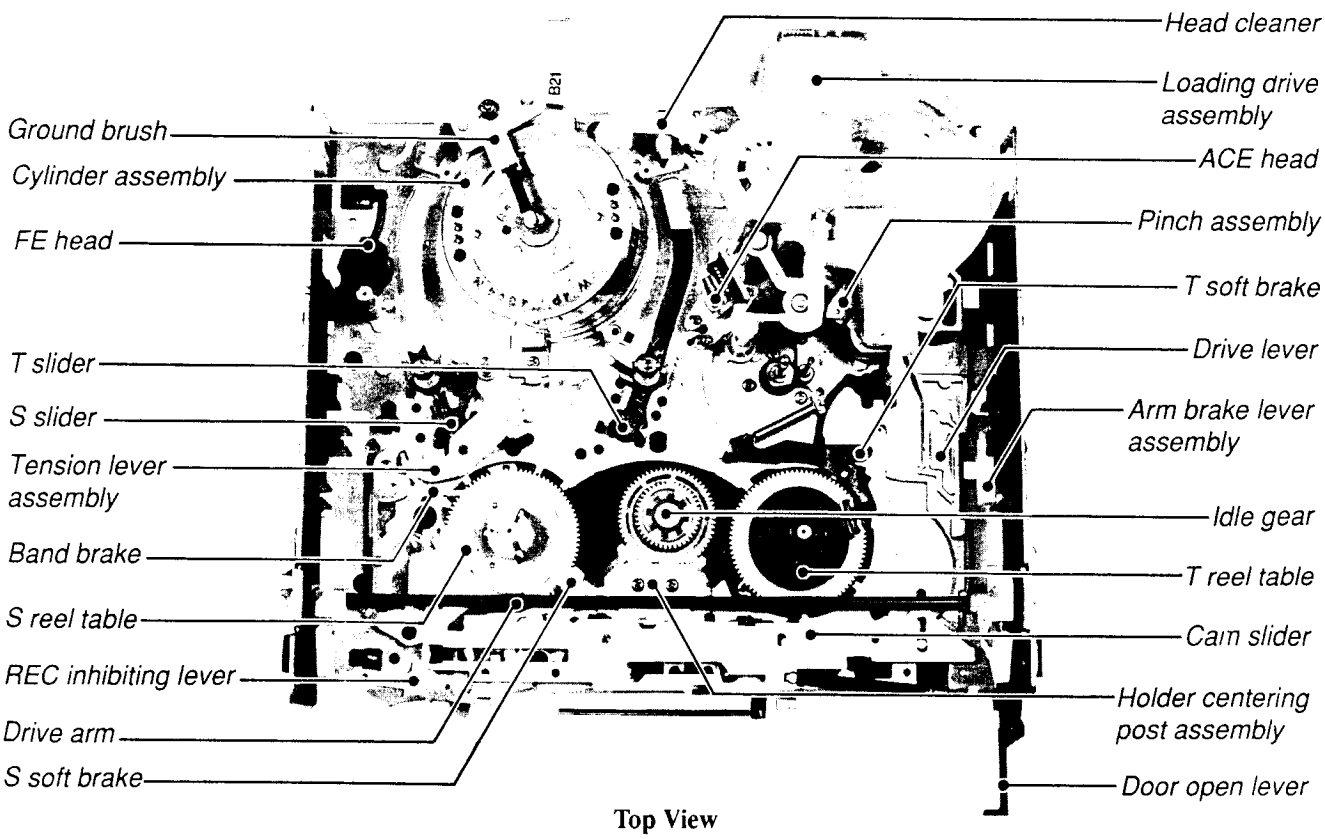
If you use a satellite receiver, make the GUIDE channel setting for satellite channels as well.

SECTION 2
ADJUSTMENT PROCEDURES

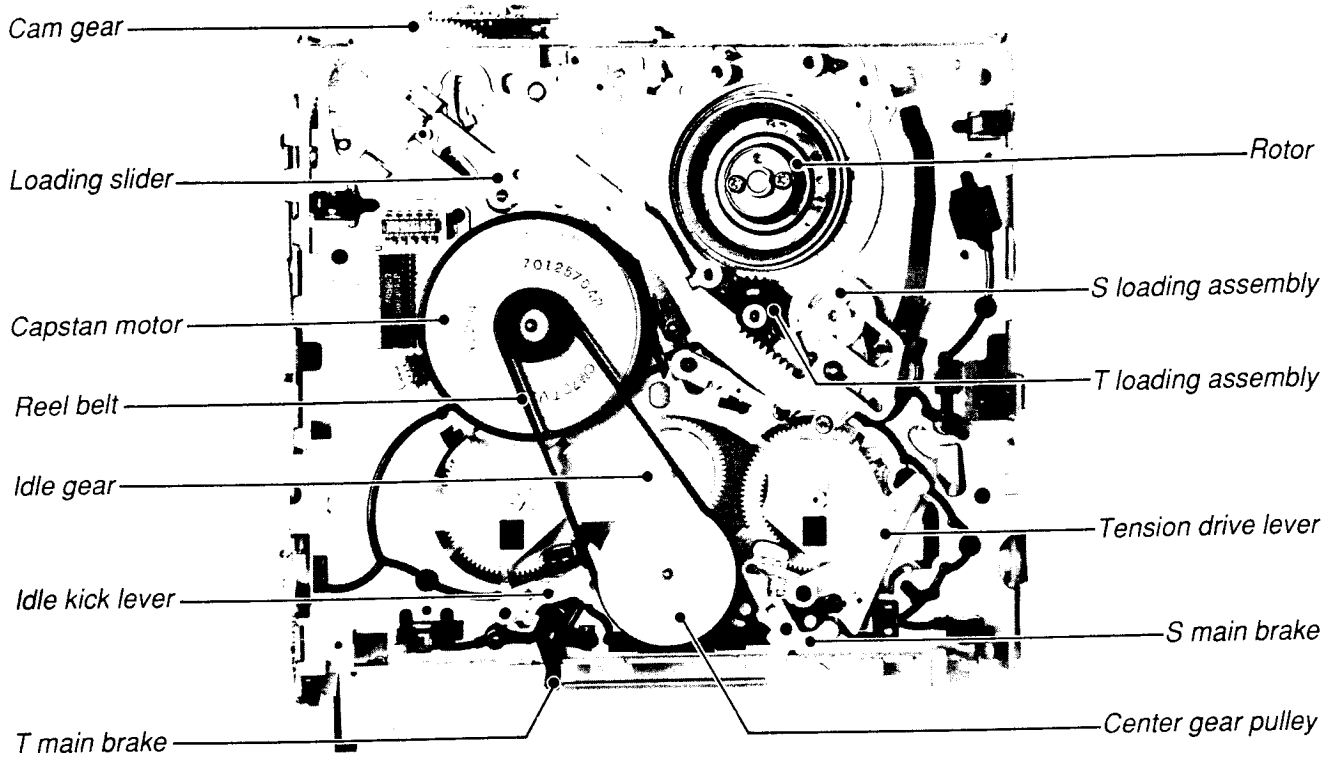
1. MECHANICAL ADJUSTMENT

1-1. Mechanical Parts Location



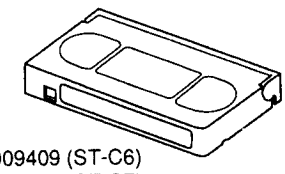
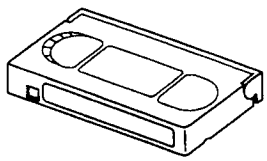
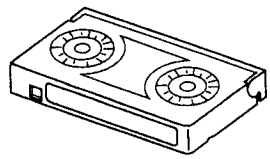
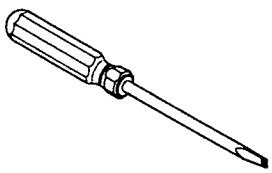
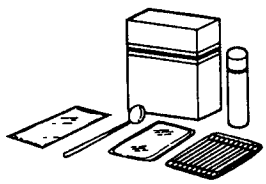
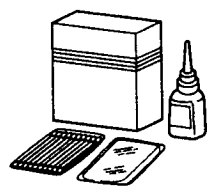
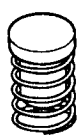


Top View



Bottom View

1-2. Servicing Jig List

Alignment tape  70909409 (ST-C6) 70909410 (ST-C7)	Back tension cassette gauge  70909103	Torque cassette gauge (KT-300NR)  70909199
Taper nut driver  70909228	VTR cleaning kit 	VTR lubrication kit 
Grease	Pre-load tool 1.8  70909416	

Note: Conventional alignment tapes ST-C1 (70909227) and ST-C3 (70909264) can be u

1-3. Main Parts Servicing Time

- Part replacement time differs from servicing life time of each part.
- Following table is prepared based on a standard condition (room temperature, room humidity). The replacement time will be varied depending upon operation environment, using methods, operation duty, etc.
- Particularly, life of the upper cylinder depends upon operation conditions

	Part Name	Service time (Operating Hours)										Note
		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
Tape Transport System	Tension post	△	△	△	△	△	△	△	△	△	△	• When cleaning, use a swab or piece of gauze soaked in alcohol. • After cleaning, cleaned parts are dried comepletely, and then load a video cassette.
	S/T slant guide post											
	Impedance roller *											
	No. 8 guide post											
	Capstan											
	No. 9 guide post											
	No. 3 guide post											
	S/T guide roller	△	△	△	O	O	O	O	O	O	O	• When lubricating, always use the specified oil. • When the lubricating, apply one or two drops of oil after the cleaning with alcohol.
	Upper cylinder	△	O	O	O	O	O	O	O	O	O	
	Slip ring assembly		O	O	O	O	O	O	O	O	O	
	FE head	△	△	△	O	O	O	O	O	O	O	
	ACE head	△	O	O	O	O	O	O	O	O	O	
	Pinch roller	△	O	O	O	O	O	O	O	O	O	
Tape Drive System	Capstan motor	△	△	△	△	△	O	O	O	O	O	• Check the back tension.
	Loading motor				O	O	O	O	O	O	O	
	Loading belt/ Reel belt	△	O	O	O	O	O	O	O	O	O	
	S reel table assembly		O	O	O	O	O	O	O	O	O	
	T reel table assembly		O	O	O	O	O	O	O	O	O	
	Idle gear assembly	△	O	O	O	O	O	O	O	O	O	
Other	Band brake assembly		O		O		O		O		O	

△ : Cleaning O : Check and replace if necessary

* There are two types. One type has an impedance roller and another type has no impedance roller.

1-4. V3 Mechanism Check Method

If the abnormal condition is caused by the mechanism itself, analyze the cause according to the following procedures.

1-4-1. External Appearance Check

(1) Check whether there are foreign matters or not inside the VTR.

(2) Check whether the cylinder and the guides for tape transport system are contaminated.

1-4-2. Motor Sensor System Check

Check whether some abnormalities are found in the motor or the sensor system (including control circuits) according to the flow chart.

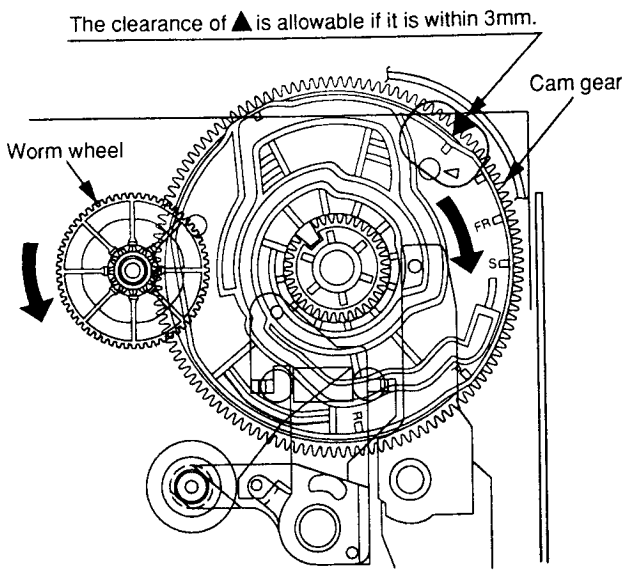
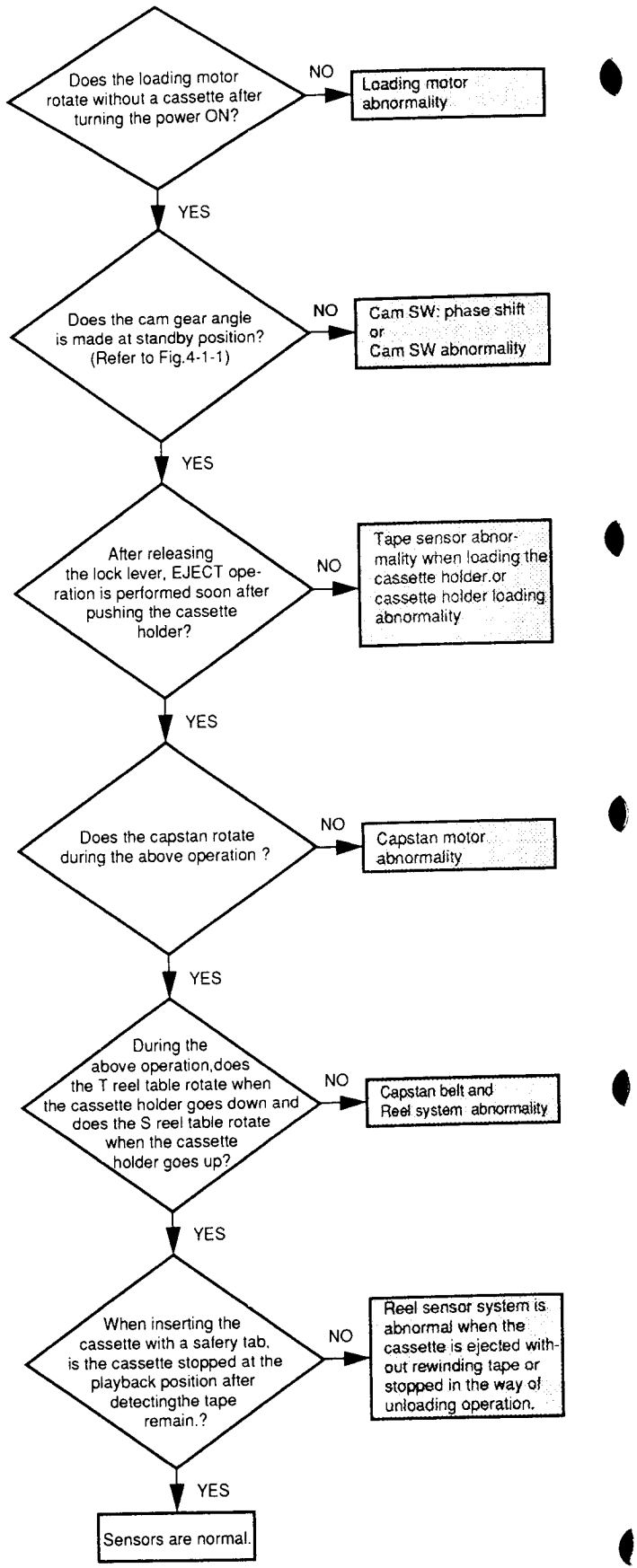


Fig. 4-1-1


Does the loading motor rotate without a cassette after turning the power ON?
NO
Loading motor abnormality
YES
Does the cam gear angle is made at standby position? (Refer to Fig.4-1-1)
NO
Cam SW: phase shift or Cam SW abnormality
YES
After releasing the lock lever, EJECT operation is performed soon after pushing the cassette holder?
NO
Tape sensor abnormality when loading the cassette holder.or cassette holder loading abnormality
YES
Does the capstan rotate during the above operation ?
NO
Capstan motor abnormality
YES
During the above operation,does the T reel table rotate when the cassette holder goes down and does the S reel table rotate when the cassette holder goes up?
NO
Capstan belt and Reel system abnormality
YES
When inserting the cassette with a safery tab, is the cassette stopped at the playback position after detectingthe tape remain.?
NO
Reel sensor system is abnormal when the cassette is ejected without rewinding tape or stopped in the way of unloading operation.
YES
Sensors are normal.

1-4-3. Abnormality Analysis by Self-check Function

The unit used V3 mechanism has a self-check function. The self-check function works as a system which stored some abnormal condition. So, use this function to try to analyze the cause(s).

For the data display method and the content of the data, refer to the self-check function (described on page 2-50) in item 2-3.

Note:

- Abnormal data is displayed only when the first abnormal condition occurs, and is not displayed in the second time. Accordingly, the claim from customers and the actual data displayed may be different.
- The data is stored only when the power turns off after occurring the abnormality condition(s). The data is not stored when the unit operation is recovered by the microcomputer.
- After repairing, initialize the data by pressing the [COUNTER RESET] button while displaying the abnormal mode.

The typical examples in abnormal condition are shown below.

Table 4-3-1

A	B	C	Abnormal Condition	Check Item
06	01	09	Cylinder is stopped at playback position during playback the tape.	Check the cylinder motor. Check if the cylinder and tape transport guide are clogged.
02	01	0d	Cylinder is stopped at FF/REW position during rewind the tape.	
06	02	09	T reel sensor is abnormal at playback postion during playback the tape.	Check the capstan motor. Refer to the cases 2 and 3 describe on the table "Defective analyzing list".
03	03	07	S reel sensor is abnormal at playback position during REVIEW the tape.	
01	04	02	Cassette-in and out operation cannot be performed.	Refer to the case 1 described on the table "Defective analyzing list".
03	05	08	Mode shift cannot be performed during shifting to REVIEW.	

A: System control mode, B: Abnormality No., C: Mechanical position when an abnormality occurs.

1-4-4. Check by Defective Analyzing List

If the abnormality causes the mechanism abnormal condition, presume, confirm and treat the defective according to the "Defective analyzing list" in table 4-4-1.

(1) Manual mechanism operation (mode shift) method

Push in the lock lever R and L manually and turn the worm wheel counterclockwise as shown in Fig. 4-1-1. The cam gear is turned clockwise and the mode shifts to the direction where the loading operation can be performed. So, check the mechanism condition in the defective mechanism position when the abnormality occurs.

(2) Defective parts replacement

When a defective occurs due to the defective part(s) and the part(s) is replaced, take care the following items.

- Especially as for the mechanical parts requiring the phase alignment, take care of the part replacement **E.g.**. Assembling mode, phase alignment mark and etc.
- As for the part(s) requiring lubricant such as a specified amount of oil or grease, apply grease or oil according to the instructions and do not stick grease or oil to the portions without allowing to stick it (especially in removal and assembly).

(3) Check after treating the defective

After replacing a defective part and/or aligning a part, first check the mechanism operation manually and confirm that no problem occurs, and then mount the mechanical deck, turn the power ON and check the mechanism operation.

Note:

- After replacing the defective parts according to the procedure of the treatment method for the "damage and phase shift of mechanical part", check the operation of the mechanism again, since the same (or similar) defective problem may occur due to other serious cause (in mechanism or electrical circuit) when performing the actual total check with turning the power on.

Table 4-4-1 Defective Analyzing List

Case	Defective Phenomenon (Main Items)	Presumed Cause (Main Cause)	Check Method
1	Power does not turn on. Loading operation is defective. Mode shift operation is defective.	<General> Mechanical stops due to mechanical phase unmatching.	Check mode shift "Cassette out FF/REW position" can be performed when turning worm wheel.
	Loading operation is not performed.	Loading motor does not rotate. (Loading motor is defective or circuit is defective.)	Check loading motor whether it turns by the outer power supply (12.5V).
	Unloading operation is not performed.	S reel does not wind the tape.	Refer to case 3 in this table.
2	Playback operation is not performed. Playback operation is defective.	<General> Main brake is not released. (ON) T soft brake is not released. (ON) Idoler does not swing. Pinch does not press.	Check mechanical position.
		Capstan motor does not rotate. (Capstan motor is defective or circuit is defective.)	Check capstan motor.
	Playback picture does not appear Video recording can not be performed.	<In case of no mechanical problem> Cylinder is defective. (Circuit is defective.)	Check cylinder assembly.
3	Playback interruption. Detective phenomenon during playback. Recording interruption.	Reel rotation detection is defective. (Sensor is defective. Circuit is defective.)	Check sensor output.
		Idler does not swing.	Check mechanical position.
		Reel belt is removed.	Check the reel belt is removed or not.
4	FF operation is not performed. FF operation is defective. REW operation is not performed. REW operation is defective. Others: REV/FF is not performed. Others: REV/FF is defective.	Main brake is not released. (ON) T soft brake is not released. (ON) Idler does not swing. Pinch is not released.	Check mechanical position.
		Capstan motor does not rotate. (Capstan motor is defective or circuit is defective.)	Check capstan motor.
5	REVIEW is not performed.	Main brake is not released. (ON) T soft brake is not actuated . Idler does not turn. Pinch does not press.	Check mechanical position.
		Capstan motor does not rotate. (Capstan motor is defective or circuit is defective.)	Check capstan motor.
6	Slot-in is not performed. Cassette can not be inserted.	<General> When the F/L is mounted on the mechanical deck,the position is not correct.	Check mechanical position.
7	Capstan servo does not work. Capstan servo is uneven. Tape speed is fast. Tape speed is slow. Tape speed is uneven. FG pulse is not output.	Capstan motor is defective.	Check capstan motor.
		ACE head control output is defective. (Circuit is defective.)	Check ACE head. Check CTL output.
8	Audio output does not come out. Audio output is small. Audio output variation is large. Audio output is uneven. Audio distortion. Audio noise. Others: Audio is defective.	ACE head is defective.	Check ACE head. Check CTL output.
		Tape transport adjustment is not defective.	Perform tape transport adjustment again after confirming tape transport condition.
		Hi-Fi head (cylinder) is defective. (Circuit is defective.)	Check cylinder. Check whether B+14V is supplied.

Treatment: If the mechanical is found out to be defective according to the procedures described above, perform the following treatment.
- •Misassembling, mechanical phase mismatch .....Repair correctly.
- •Parts defect, parts damage.....Replace parts.

If the mechanical is found out not to be defective according to the procedures above, check the circuit(s)

1-5. Mechanical Deck Removal and Mounting

1-5-1. Mechanical Deck Removal

1. Remove five screws (2) mounting the top cover (1) and remove the top cover (1) sliding backward and lifting upward.
2. Remove two screws (4) securing the front panel (3), and remove the front panel (3).

Note:

These screws (4) are not always applied to all VTRs.

3. Remove the FFC (7) connecting the main unit (5) and the KDB unit (6).

Note:

Be sure to remove the FFC on the KDB unit side.

4. Remove two screws (9) securing the power unit (8).
5. Remove three screws (11) securing the mechanical deck (10).
6. Remove the claw securing the main unit (5) and the terminal board (12).
7. Remove the mechanical deck (10) with the main unit (5) from the chassis lifting the terminal board (12) slightly and pulling the top bracket (13) upward.

Note:

When pulling the top bracket (13) upward, take care not to deform the reinforcement plate located below the F/L assembly.

8. Remove the lead wire connecting between the mechanical deck (10) and the main unit (5).
9. Turn over the mechanical deck (10).
10. Remove the reel belt (16) and one screw (17).
11. Remove four claws securing the mechanical deck (10) and the main unit (5), and then remove the main unit (5) pulling upward.

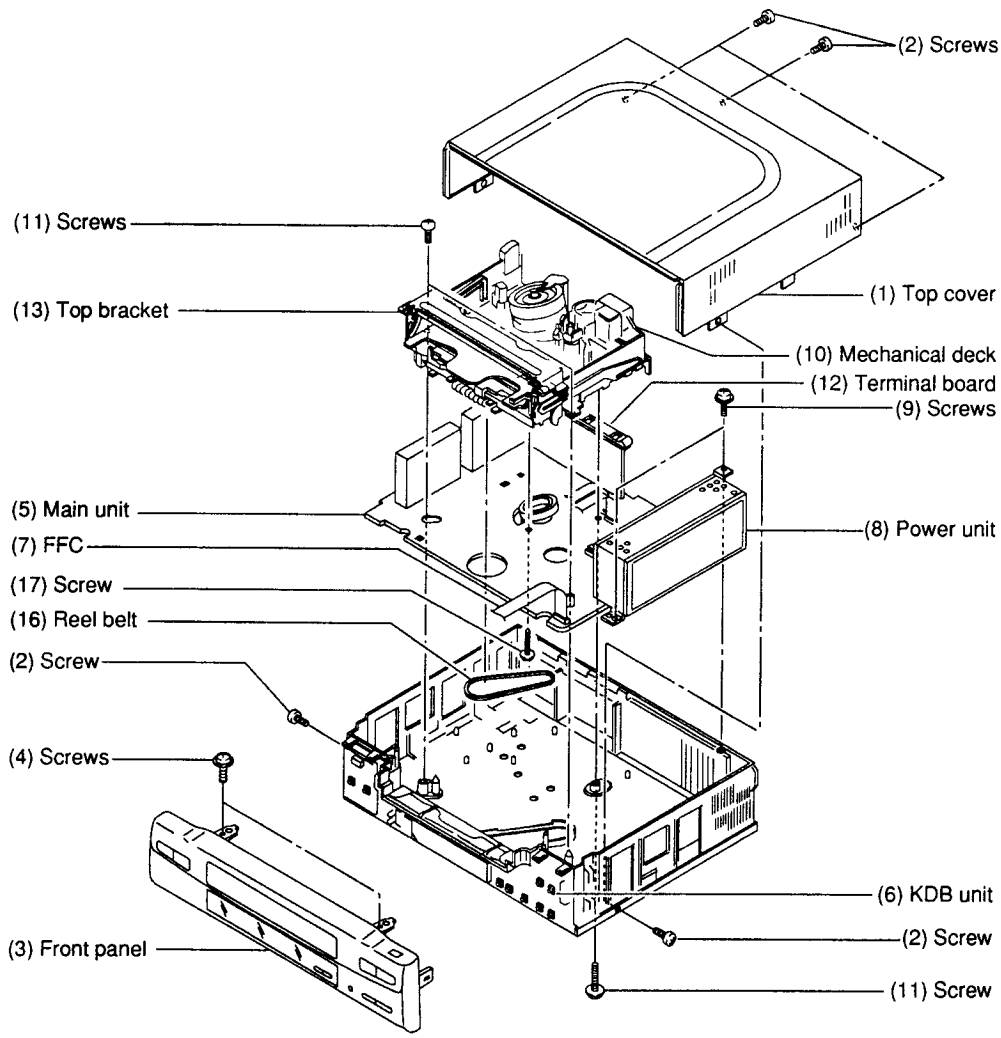


Fig. 5-1-1

1-5-2. Mechanical Deck Mounting

1. Turn over the mechanical deck and lower the main unit vertically adjusting the tape end sensor and etc. to the holes.

Note:

- Adjust the rotor of the cylinder motor and the stator of the main unit, and then lower the main unit further more till four claws catch the mechanical deck completely.
- Take care not to damage the rotor and the stator.
- When locking the claw of the front right side to the main unit, turn the REC inhibit lever so as not to damage the switch.

2. Mount the mechanical deck on the chassis in reverse order of removal.

Note:

When mounting the front panel, mount it with its door fully open.

1-5-3. Confirmation of Each Operation Mode without Cassette

1. Shut out the light to the start/end sensor.
2. Release the both sides of the lock lever and make a slot-in condition.
3. Turn the reel table manually located on the opposite side of the rotating reel table.
4. In this condition, confirmation of each operation mode can be performed.

Note:

When turning the opposite side reel table of the rotating reel table manually in playback, FF/REW mode, and sending no reel pulse, the auto eject or power off function is performed.

1-6. Main Parts Replacement

1-6-1. Top Bracket Replacement

1. Remove two securing screws (2) on the top bracket (1).
2. Remove the top bracket (1) lifting in the direction shown by the arrow.

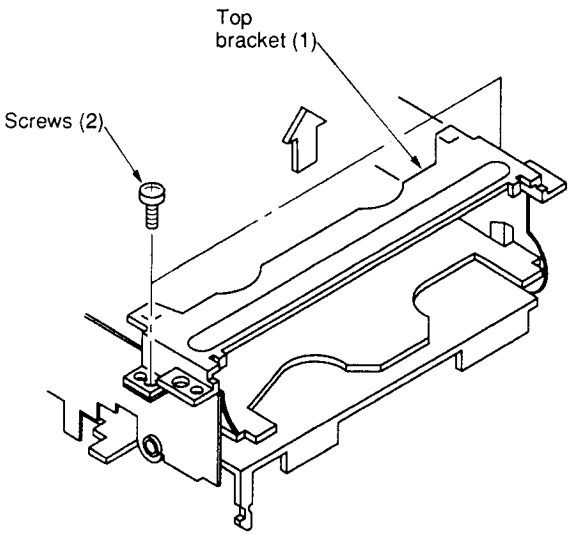


Fig. 6-1-1

3. When mounting the top bracket (1), move the tip of the grip lever (3) on the cassette holder assembly to the inclined portion of a trapezoidal cam, and then mount the top bracket (1).

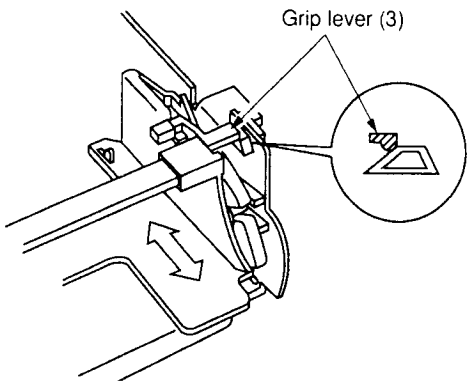


Fig. 6-1-2

Note:

- After remounting the top bracket (1), move the cassette holder forward and backward, and then confirm the claws of the lock lever (5) catch completely the both left and right sides of the stopper section (4) at the top bracket (1).

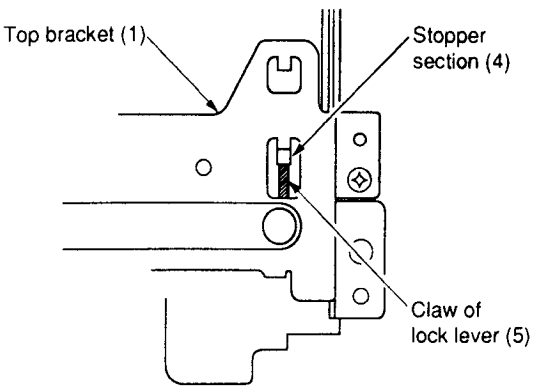


Fig. 6-1-3

1-6-2. Cassette Holder Assembly Replacement

1. Remove the top bracket. (Refer to item "1-6-1. Top Bracket Replacement".)
2. The cassette holder assembly (1) is guided along the guide grooves (2) with both left and right bosses of the cassette holder assembly (1). So first remove each side boss (3) on both left and right sides of cassette holder assembly (1) from the guide groove (2).
3. When the cassette holder assembly (1) is set at the EJECT position, the boss is located at (a), so move the boss from (a) to (b) and remove the bosses on both left and right sides simultaneously.

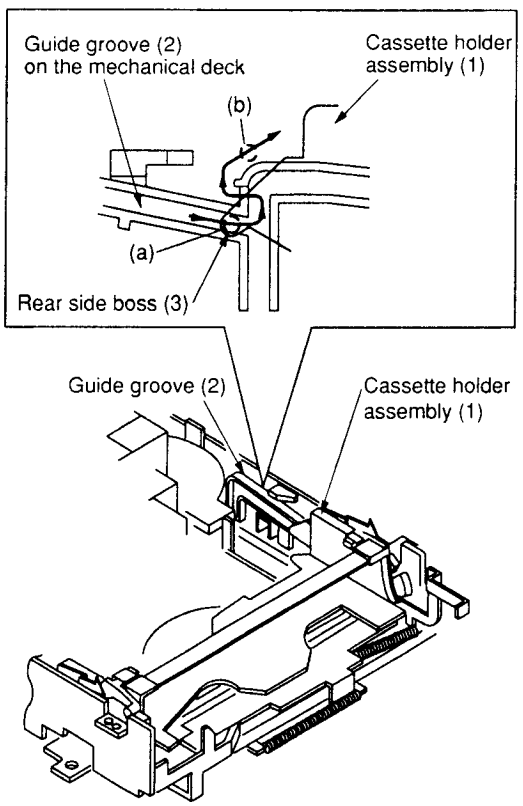


Fig. 6-2-1

Note:

The grip lever (4) on the cassette holder assembly (1) may catch the trapezoidal cam on the mechanical deck (2), so perform the work lifting the grip lever in the direction shown by the arrow.

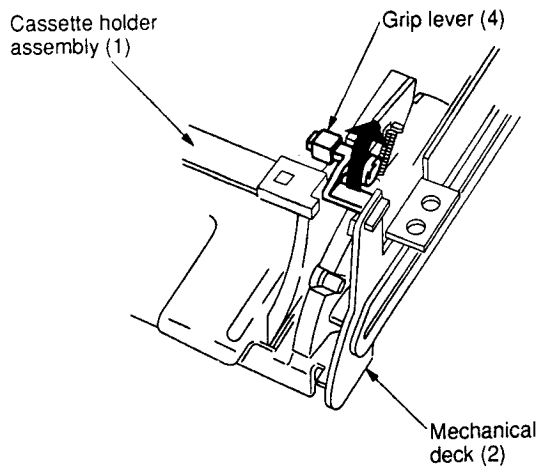


Fig. 6-2-2

4. After removing the front side bosses (5) on both left and right sides, remove the cassette holder assembly (1) pulling to the front side.
5. When mounting the cassette holder assembly (1), insert the front side bosses (5) to the U shaped groove of the drive arm (6) and the guide groove (2) on the mechanical deck lifting the rear side of the cassette holder assembly (1).

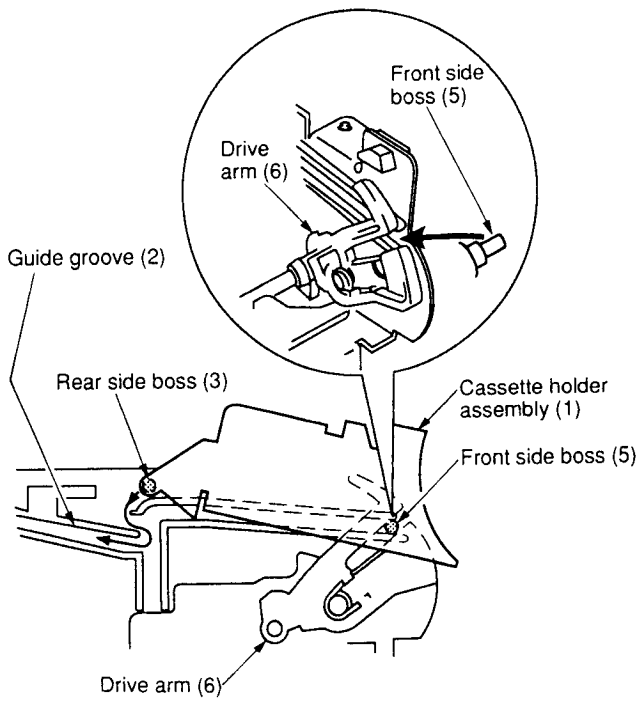


Fig. 6-2-3

6. When mounting the rear side bosses (3), perform the reverse order of removal.

1-6-3. Door Open Lever Replacement

1. Release the lock lever (2) on the cassette holder assembly (1) pressing in the direction shown by the arrow.

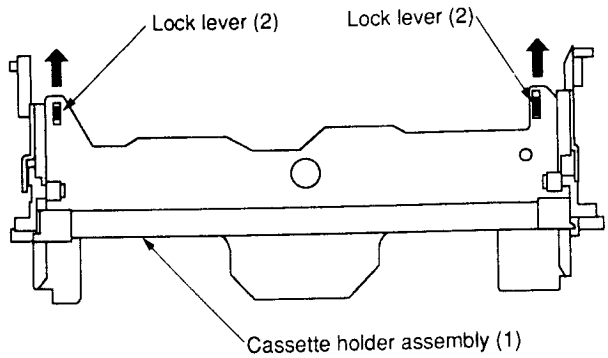


Fig. 6-3-1

2. Move the cassette holder assembly (1) slightly to the rear side.
3. Remove the claws (A) and (B) on the door open lever (3) from the mechanical deck (4).
4. Match the boss on a new door open lever (3) and the hole (C) on the mechanical deck, and then insert the claws (B) first and then (A) to the mechanical deck (4).

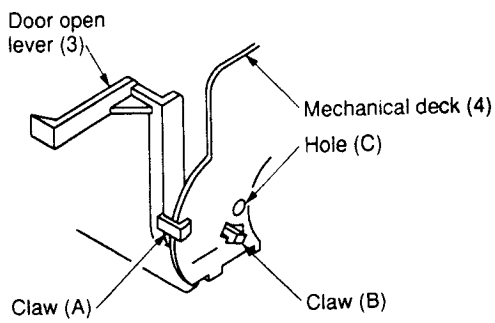


Fig. 6-3-2

5. Remount the cassette holder assembly to the position as it was.

1-6-4. Drive Lever Gear Replacement

1. Make the cassette holder assembly to the slot-out (EJECT) position.

Note:

- In this condition, both mark holes on the F/L drive slider (1) and the mechanical deck fit with each other, also the hole of the boss on the drive lever gear (2), the center of the gear tooth and the marking line are in line.

2. Move the claw of the drive arm (3) to the direction of the arrow (A) and remove the drive lever gear (2) upward.

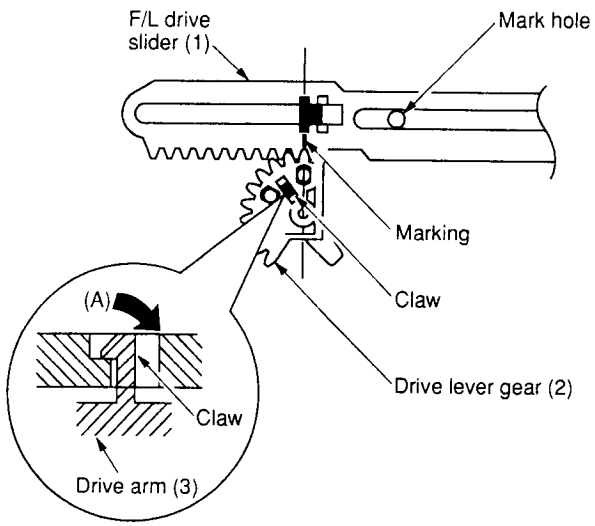


Fig. 6-4-1

3. When remounting the drive lever gear (2), take care of the phase position (refer to the note described above.) and mount in the reverse order of removal.

1-6-5. Drive Arm Assembly Replacement

1. Remove the top bracket assembly. (Refer to item "1-6-1. Top Bracket Replacement".)
2. Remove the cassette holder assembly. (Refer to item "1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the door open lever. (Refer to item "1-6-3. Door Open Lever Replacement.")
4. Remove the drive lever gear. (Refer to item "1-6-4. Drive Lever Gear Replacement".)
5. Pull the REC-inhibiting lever slightly to the front side, turn the drive arm assembly (1) to the front side and push it in the direction shown by the arrow. Remove the left side boss (2) on the drive arm assembly (1) from the cutout of the guide groove on the mechanical deck (3).
6. Remount the drive arm assembly (1) in the reverse order of removal.

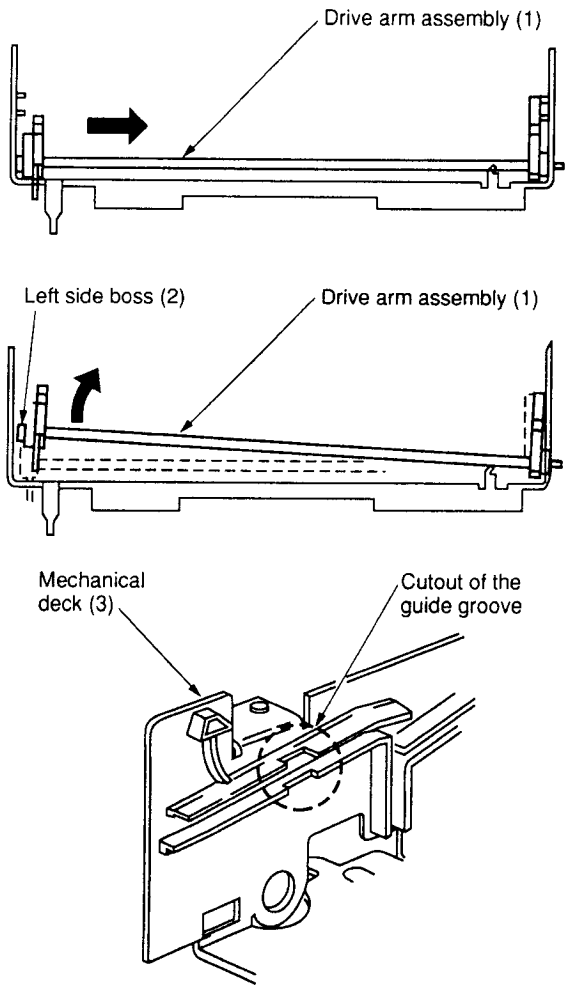


Fig. 6-5-1

1-6-6. Cam Lever Replacement

1. Remove the top bracket. (Refer to item "1-6-1. Top Bracket Replacement".)
2. Remove the cassette holder assembly. (Refer to item "1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the cam slider. (Refer to item "1-6-40. Cam Slider Replacement".)
4. Remove the loading drive assembly. (Refer to item "1-6-28. Loading Drive Assembly Replacement".)
5. Remove the drive lever. (Refer to item "1-6-39. Drive Lever Replacement".)
6. Remove the pinch roller assembly. (Refer to item "1-6-20. Pinch Roller Assembly Replacement".)
7. Remove the cam gear. (Refer to item "1-6-30. Cam Gear Replacement".)
8. Move the cam lever (1) until it stops in the direction shown by the arrow (A). Pull out the cam lever (1) lifting up straightly at the position where the cam lever (1) stops.
9. Apply grease to the portions of bosses (A) to (C) on a new cam lever.

Note:

- Confirm that the boss (A) on the cam lever (1) is inserted into the hole on the F/L drive slider (2).
- After inserting the cam lever (1), confirm that the cam lever (1) moves smoothly.

10. Replace the cam lever in the reverse order of removal.

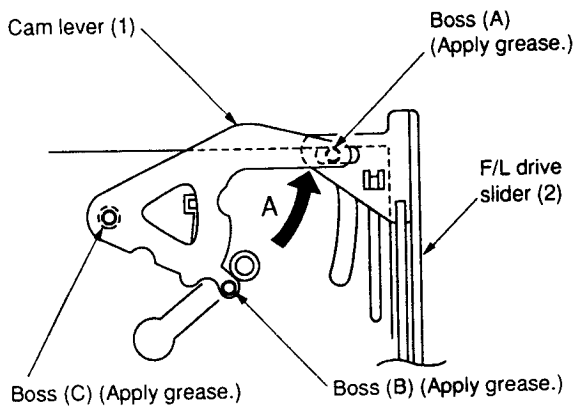


Fig. 6-6-1

1-6-7. F/L Drive Slider Replacement

1. Remove the top bracket. (Refer to item "1-6-1. Top Bracket Replacement".)
2. Remove the cassette holder assembly. (Refer to item "1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the cam slider. (Refer to item "1-6-40. Cam Slider Replacement".)
4. Remove the loading drive assembly. (Refer to item "1-6-28. Loading Drive Assembly Replacement".)
5. Remove the drive lever. (Refer to item "1-6-39. Drive Lever Replacement".)
6. Remove the pinch roller assembly. (Refer to item "1-6-20. Pinch Roller Assembly Replacement".)
7. Remove the cam gear. (Refer to item "1-6-30. Cam Gear Replacement".)
8. Remove the cam lever. (Refer to item "1-6-6. Cam Lever Replacement".)
9. Remove the drive lever gear. (Refer to item "1-6-4. Drive Lever Gear Replacement".)
10. Push the F/L drive slider (1) in the direction shown by the arrow (A) and slide it. Furthermore, pull out it to the front side lifting it in the direction shown by the arrow (B).
11. Apply grease to the shaded parts (a) to (d) on a new F/L drive slider (1).

Note:

For the phase alignment of the drive lever gear, refer to item "1-6-4. Drive Lever Gear Replacement".

12. Replace the F/L drive slider (1) in the reverse order of removal.

Note:

After completion of the replacement, confirm that the F/L drive slider (1) moves smoothly.

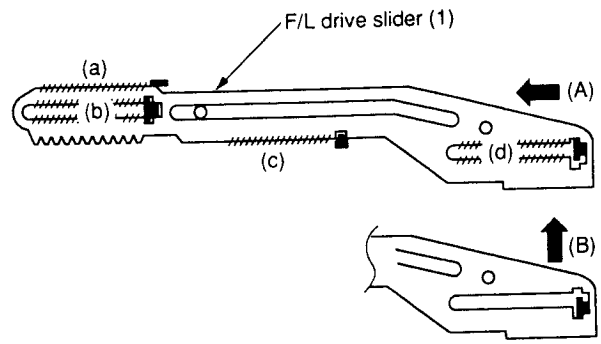


Fig. 6-7-1

1-6-8. Arm Brake Lever Assembly and Arm Brake Torsion Spring Replacement

1. Make the cassette holder assembly to the slot-out (EJECT) position.
2. Turn the arm brake lever assembly (1) in the direction shown by the arrow (A) until it stops. Pull out the arm brake lever assembly (1) to the front at the position it stops.

Note:

Take care that the arm brake torsion spring (2) is removed forcefully.

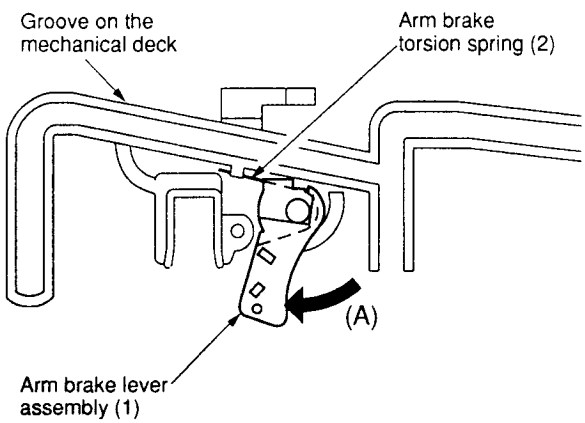


Fig. 6-8-1

3. Hook the arm brake torsion spring (2) temporarily to a new arm brake lever assembly (1).

Note:

Take care of the direction of the arm brake torsion spring (2) so that the longer end of the arm brake torsion spring (2) is hooked on the temporary hook.

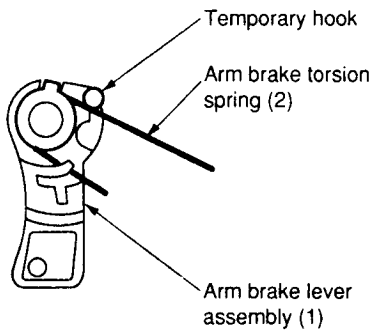


Fig. 6-8-2

4. Insert the hook portion on the arm brake lever assembly (1) to the cutout on the mechanical deck.
5. Turn the arm brake lever assembly (1) counterclockwise and fix it at the position which the arm brake lever assembly (1) faces to the straight below.
6. When pushing the tip of the arm brake torsion spring (2) located at (B) position, the tip is removed from the temporary hook and moves to the hook on the mechanical deck.
7. The arm brake lever assembly turns to the specified position by force of the arm brake torsion spring.

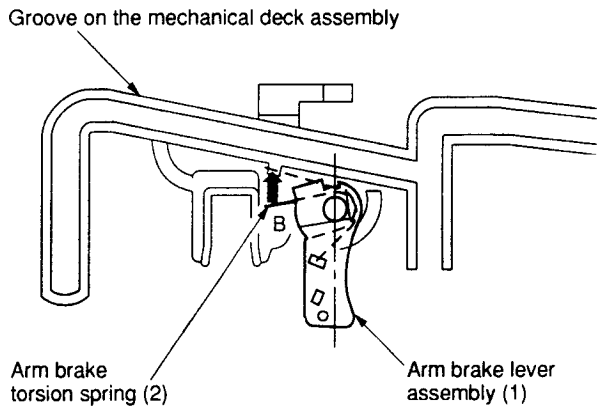


Fig. 6-8-3

1-6-9. Cylinder Assembly Inspection and Replacement

<Inspection>

1. Check if the tape transport surface on the lower cylinder assembly are not damaged.
2. Check if the rotation of the upper cylinder assembly is not abnormal.

When any abnormality is found according to the inspection procedures described above 1 and 2, replace the cylinder assembly.

<Replacement>

1. Remove the ground brush assembly.
2. Remove the head cleaner. (Refer to item "1-6-13. Head Cleaner Replacement.")
3. Remove the FFC (1) on the pre amplifier.
4. Remove three screws (2) and the cylinder holding plate (3) and (4). (Refer to item "1-6-12. Cylinder Holding Plate Replacement".)
5. Remove the cylinder assembly (5).
6. Remount the cylinder assembly (5) in the reverse order of removal. Fix the cylinder pressing slightly in the direction shown by the arrow A and the cylinder holding plate (3) pressing slightly in the direction shown by the arrow (B). (Tightening torque: 294 – 392 mN•m (3 – 4 kg•cm))

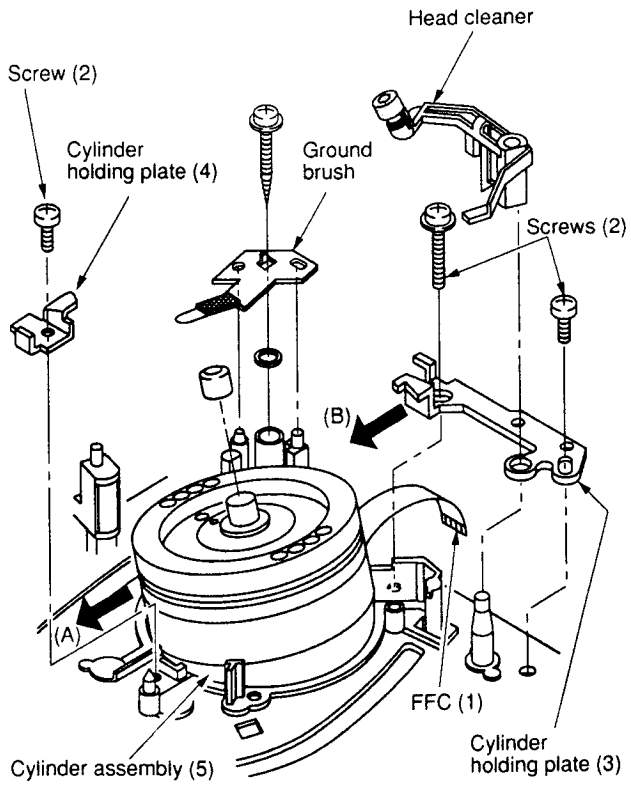


Fig. 6-9-1

Note:

- When remounting the cylinder holding plate (3), insert the FFC under the tip of the cylinder holding plate (3).
- When replacing, take much care not to touch the video head directly and damage the cylinder.

7. Perform the tape transport adjustment.

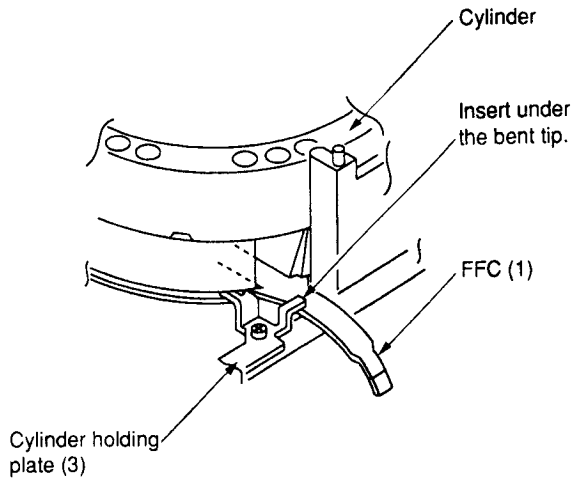


Fig. 6-9-2

1-6-10. Upper and Lower Cylinder Assembly Replacement (Rotor Assembly Replacement)

Note:

- When handling a cylinder, always put on gloves, etc. Do not touch the cylinder directly with your naked hand.
- Do not touch video heads (1) with your hand. If touched they may be easily damaged.
- Do not apply excessive force to the rotor assembly light FG section (2).

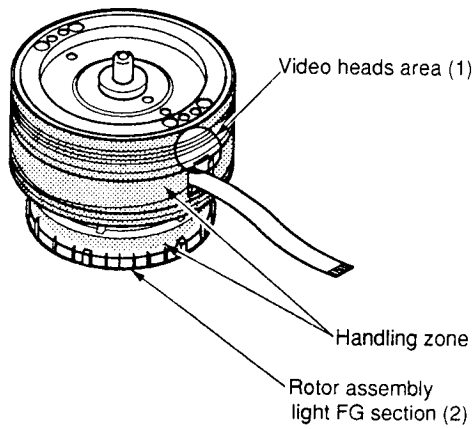


Fig. 6-10-1

<Disassembling>

1. Remove the cylinder assembly from the mechanical deck.
2. Place the cylinder upside down, and remove the rotor assembly (1) from the cylinder assembly.

Note:

The cylinder has two types of rotor assembly, and removal methods for each is different as stated below

1) Screw securing type (Fig. 6-10-2)

- Remove two securing screws (2) and remove the rotor assembly (1).

Note:

Take care not to lose rubber dampers attached to securing screws (2).

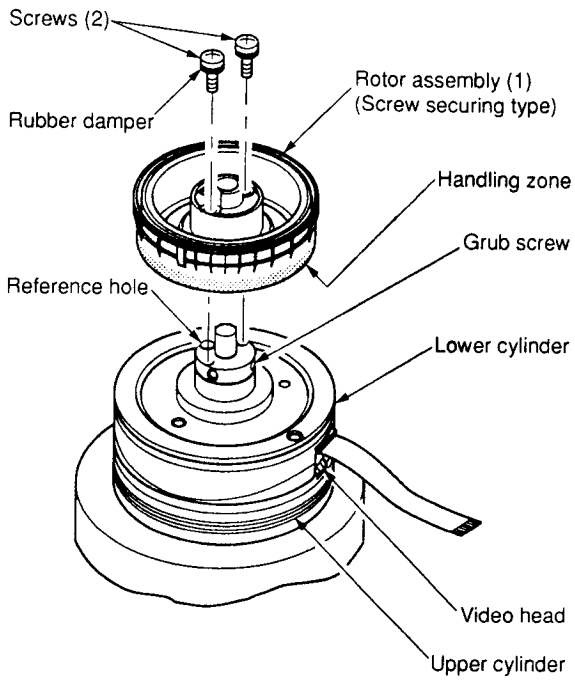


Fig. 6-10-2

2) Press-fit securing type (Fig. 6-10-3)

- Hold outer side of upper cylinder (3) and slowly pull out the rotor while rotating the rotor slowly.

Note:

Do not apply an excessive force to the rotor assembly light FG section.

(When replacing the rotor assembly (1), refer to step 3 of ing>".)

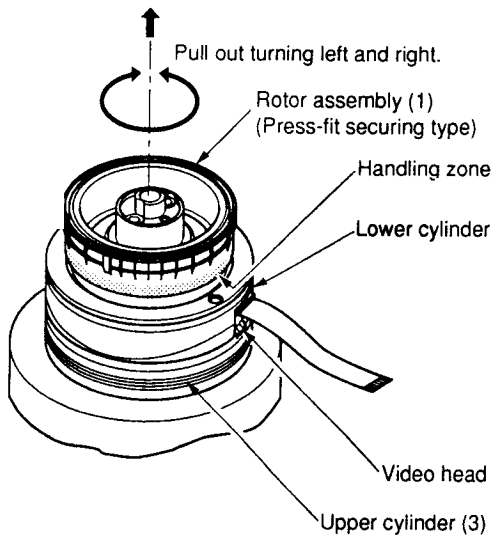


Fig. 6-10-3

3. Loosen set screw (4) at side of pre-load boss (3), using a hex wrench and remove the pre-load boss (3) and pre-load spring (5).

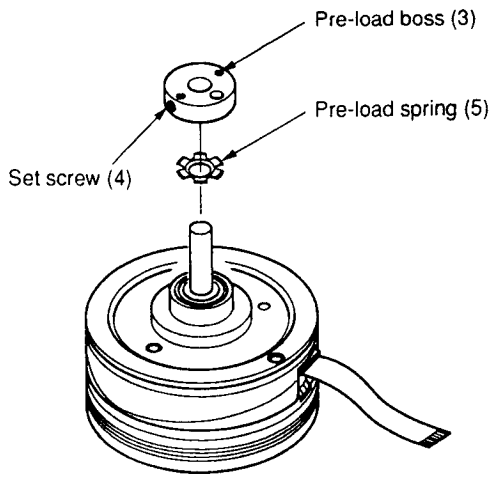


Fig. 6-10-4

4. Slowly pull out the upper cylinder assembly (6) from the lower cylinder assembly (7). In this case, remove R. T gap washers (8) inserted onto the shaft. Also, remove ground cap (9) put on the shaft of upper cylinder assembly (6). The R. T gap washers (8), and ground cap (9) are used again in assembling, so, keep them securely.

5. If tip (carbon contact) of ground cap (9) is excessively worn out, replace the ground cap (9).

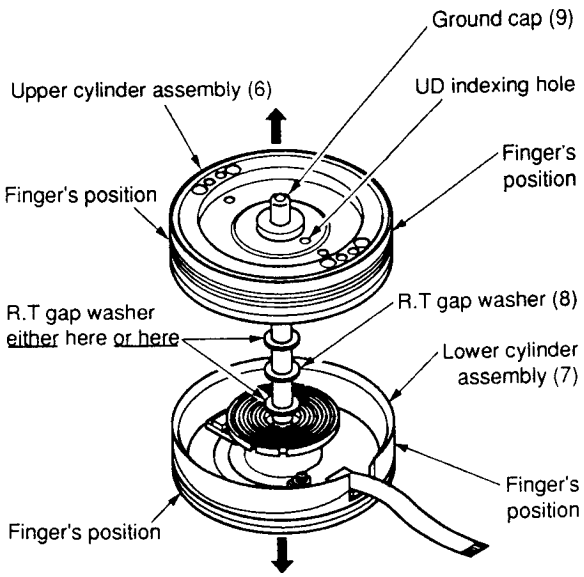


Fig. 6-10-5

<Assembling>

1. Insert R. T gap washers into a new upper cylinder shaft, and install the upper cylinder to the lower cylinder assembly.

Note:

- Since the shaft and bearing (1) are machined with high accuracy, insert the shaft just vertically into the bearing (1) so that unreasonable force is not applied.
- Take care the shaft and inside cylinder are free from any foreign matters such as dusts, etc.

2. Apply pre-load spring (2) to the bearing (1).
   1) Place the cylinder upside down, insert the pre-load spring (2) and pre-load boss (3) into the shaft, and align phase of the reference video head and the pre-load boss reference hole.

Note:

Do not confuse outside and inside of the pre-load spring (2).

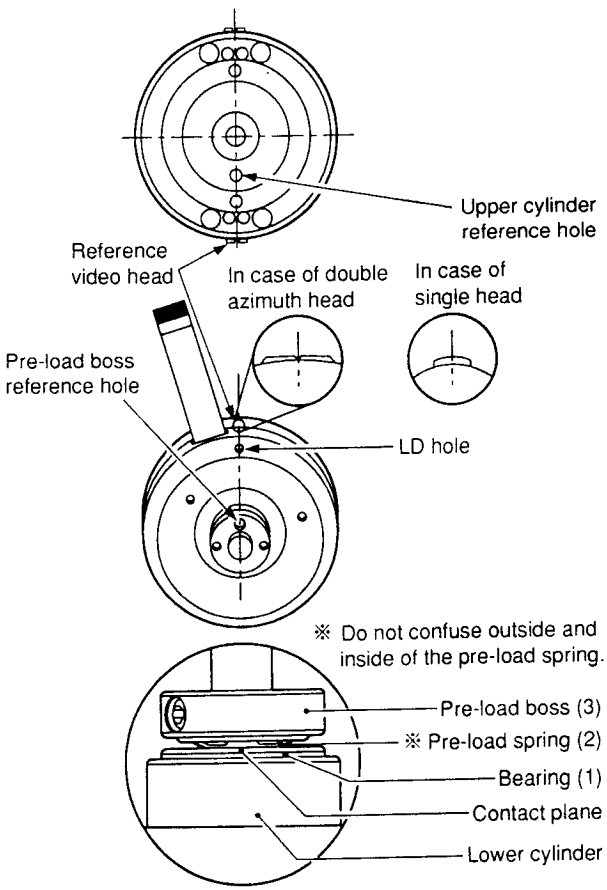

Upper cylinder reference hole
Reference video head
In case of double azimuth head
In case of single head
Pre-load boss reference hole
LD hole
※ Do not confuse outside and inside of the pre-load spring.
Pre-load boss (3)
※ Pre-load spring (2)
Bearing (1)
Contact plane
Lower cylinder

Fig. 6-10-6

2) Place the PRE-LOAD TOOL 1.8 (4) (Part No.: 70909416) on the pre-load boss (3) and press it with a finger until it touches end of the shaft.

3) Under condition of 2-2) above, tighten the set screw at the pre-load boss side with a hex wrench.

4) Confirm deviation of the phase. If deviated, loosen the set screw and repeat steps 2-1) through 3).

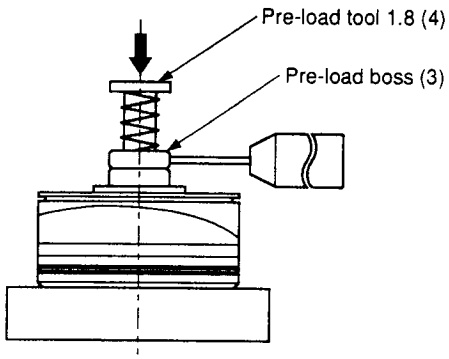


Fig. 6-10-7

3. Mount the rotor assembly (5).

1) Screw securing type (Fig. 6-10-8)

- Align the pre-load boss reference hole (6) and the rotor assembly reference hole (7), and fix the rotor assembly (5) with two screws (8). (Tightening torque: 200 – 300mN•m)

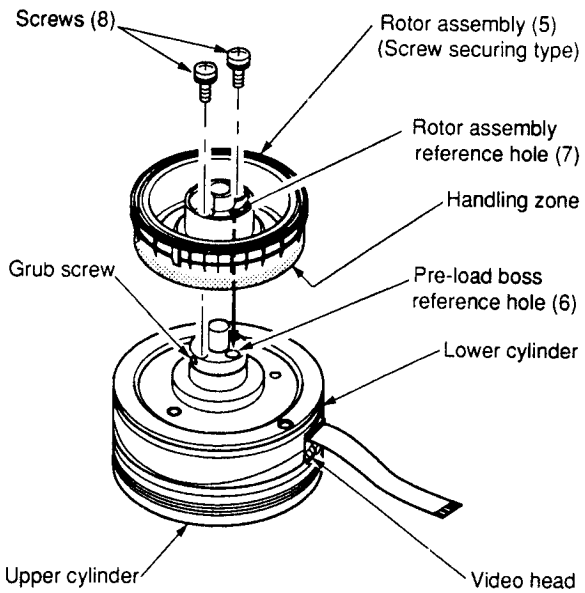


Fig. 6-10-8

2) Press-fit securing type (Fig. 6-10-9)

- Align the pre-load boss reference hole (6) and the rotor assembly reference hole (7), and then press the rotor assembly (5) with a finger until it touches the pre-load boss. In this case, the press-fitting can be easily made by putting a coin between the rotor assembly (5) and the finger.

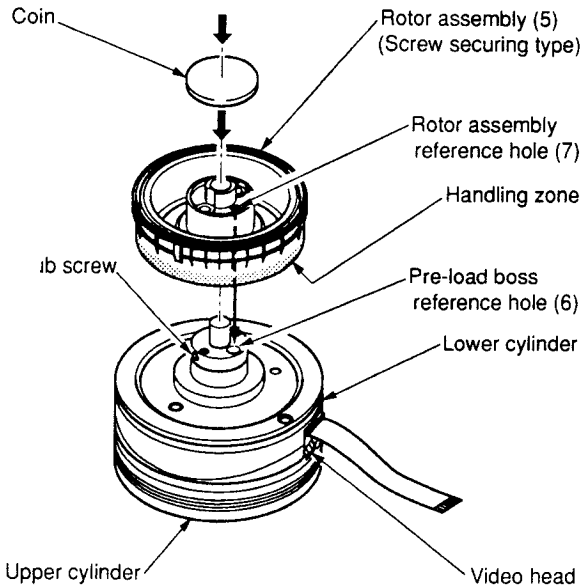


Fig. 6-10-9

- Confirm deviation of phase after the mounting. If deviated, correct the phase by rotating the rotor assembly (5).

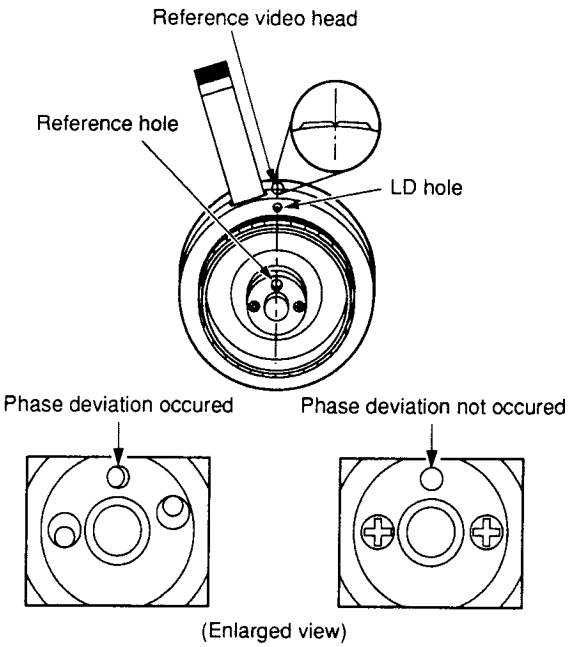


Fig. 6-10-10

4. Confirm outside of the cylinder is free from scratches. dirt, and the cylinder rotates correctly without any abnormality.
5. Mount the cylinder assembly on the mechanical deck.
6. Perform the tape transport adjustment.

1-6-12. Cylinder Holding Plate Replacement

1. Remove screws (1) and (2) securing the cylinder holding plate (3) and a screw (5) securing the cylinder holding plate (4).
2. Remove the cylinder holding plate (3) and (4) sliding in the direction shown by the arrow (B) and (A).
3. Eliminate the cylinder lock key (wedge shaped parts).
4. After replacing the cylinder holding plates (3) and (4), mount new parts in the reverse order of removal.

Note:

- When remounting, fix the cylinder while pushing in the direction shown by the arrow (A) and the cylinder holding plate (3) in the direction shown by the arrow (B). Then tighten three screws while pushing the cylinder holding plate (4) toward the stopper on the outsert of the mechanical deck.
- Take care of the position inserting the FFC. (Refer to item "1-6-9. Cylinder Assembly Inspection and Replacement".)
- Tightening order of the screws is (1) → (2) → (5).
- Tightening torque of the screws (1), (2), (5) is 294 – 392 mN•m (3 – 4 kg•cm).
- Take care of the position inserting the FFC when mounting the cylinder holding plate (3). (Refer to item "1-6-9. Cylinder Assembly Inspection and Replacement".)

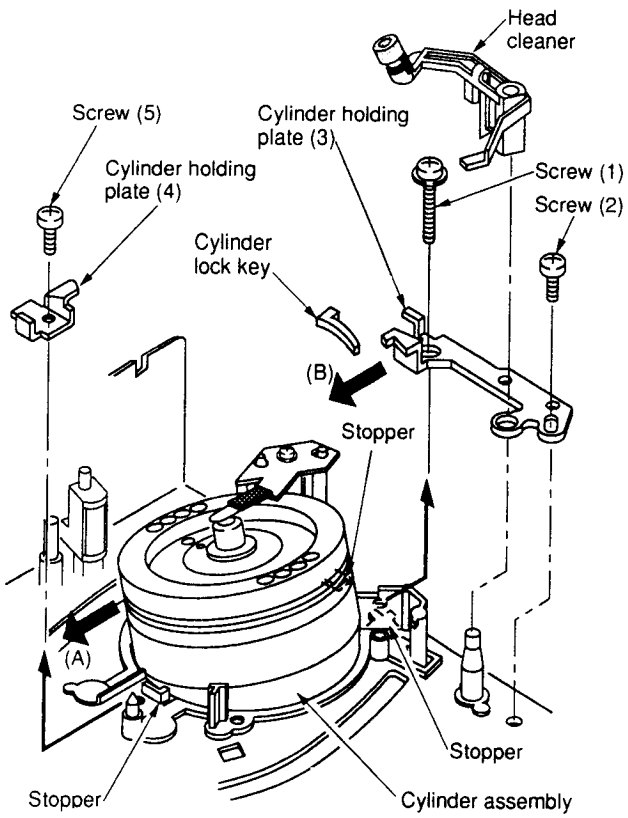


Fig. 6-12-1

1-6-13. Head Cleaner Replacement

<Roller sub assembly replacement>

1. Remove the roller sub assembly (2) pulling upward from the hook (A) on the cleaner lever (1).
2. After replacing the roller sub assembly, mount in the reverse order of removal.

<Cleaner lever replacement>

1. Undo the hook (B) of the cleaner lever (1) from the mechanical deck, and pull out the cleaner lever (1) upward.
2. Replace the cleaner lever (1) on the roller sub assembly (2), and mount the cleaner lever (1) in the reverse order of removal.

Note:

- Take care the roller sub assembly (2) is not stained with grease or oil.

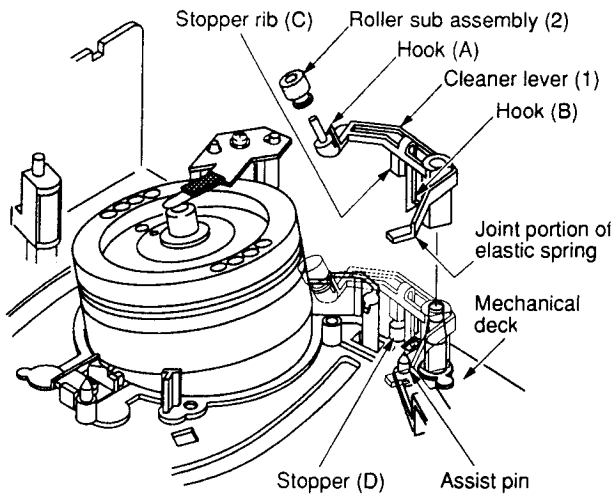


Fig. 6-13-1

Note:

- When remounting the head cleaner, position the stopper rib (C) in front of the stopper (D).

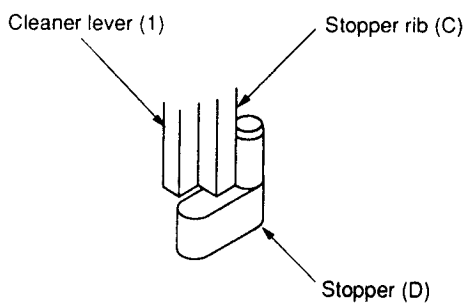


Fig. 6-13-2

Note:

- Confirm that the joint portion (E) of the elastic spring positions in front of the assist pin (F) on the cleaner assist lever (4).

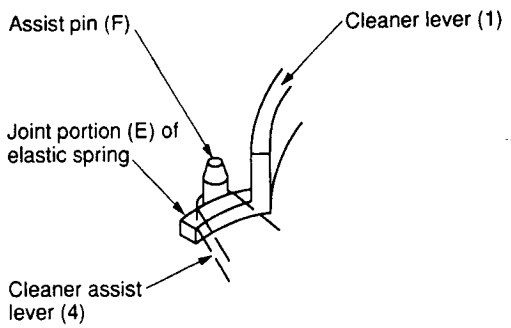


Fig. 6-13-3

1-6-14. No. 8, No. 3 Guide Sleeves Replacement

1. When replacing the No. 8 guide sleeve (1), first remove the guide cap (2) on the loading bracket assembly.
2. Pull out the guide sleeve (1) from the guide post (3).

Note:

- Take care not to break the No. 8, No. 3 guide posts on the mechanical deck if twisting the guide sleeve forcefully.

3. Insert a new guide sleeve (1) to the guide post.

Note:

- When inserting the guide sleeve (1), take care so that its hole faces the opposite side to the tape transport surface.

4. For No. 8 guide sleeve, insert the No. 8 guide cap (2) onto it.

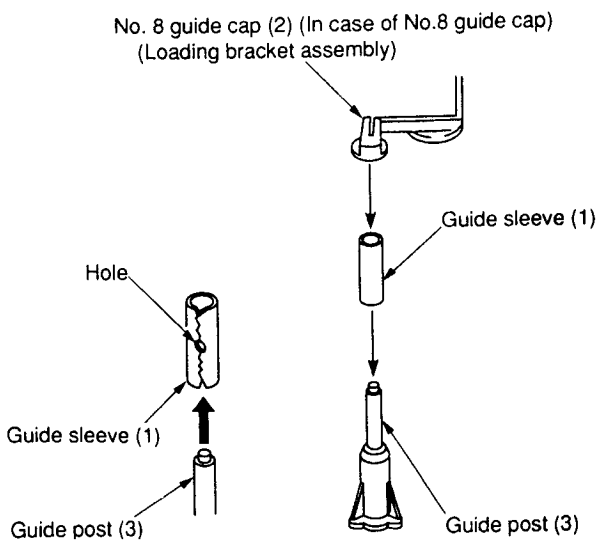


Fig. 6-14-1

1-6-15. ACE Head Assembly Replacement

1. Remove the FFC (1) from the connector.
2. Remove two screws (2) and remove the ACE main base (3) and ACE head assembly (4).
3. Remove three adjusting screws (5), (6), and (7) and then remove the ACE head assembly (4).

Note:

- When replacing ACE head (9) only without replacing its PC board, unsolder the ACE head (9) on the ACE head PC board (8) and then remove the ACE head (9) and the ACE head PC board (8).

4. Mount the ACE head assembly (4) in the reverse order of removal.

Note:

- When reassembling the ACE head assembly (4), First set the ACE springs (10) between the ACE head assembly (4) and the ACE main base (3), and secure the adjusting screws (5), (6), and (7).

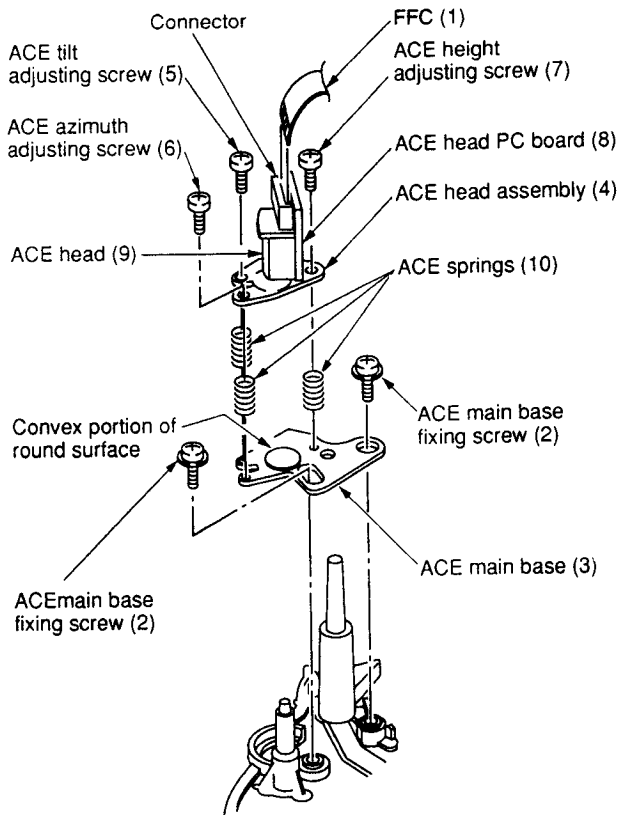

Connector
FFC (1)
ACE tilt adjusting screw (5)
ACE height adjusting screw (7)
ACE azimuth adjusting screw (6)
ACE head PC board (8)
ACE head assembly (4)
ACE head (9)
ACE springs (10)
Convex portion of round surface
ACE main base fixing screw (2)
ACE main base (3)
ACEmain base fixing screw (2)

Fig. 6-15-1

- When securing three adjusting screws, mount the ACE main base (3) and ACE head assembly (4) so that the clearance between them becomes parallel with the specified preset value (4.3 ± 0.1 mm).

5. After replacing, perform the tape transport adjustment.

Note:

- When replacing the ACE head assembly (4), always use an ACE head (9) having the same part number. Do not use any other ACE head assembly.

1-6-16. FE Head Replacement

1. Open the FE head holding hook (1) on the mechanical deck slightly in both left and right directions and remove the FE head (2) by moving in the direction shown by the arrows.
2. Replace the FE head (2) and mount the parts in the reverse order of removal.
3. Perform adjustment from the linearity adjustment item in the tape transport system adjustment.

Note:

- When mounting the FE head, Push the head backward completely.
- Though FE head (2) can be removed upward by opening the FE head holding hook (1) to both left and right directions, perform the standard replacement procedure described above since this may cause deformation of the hook.

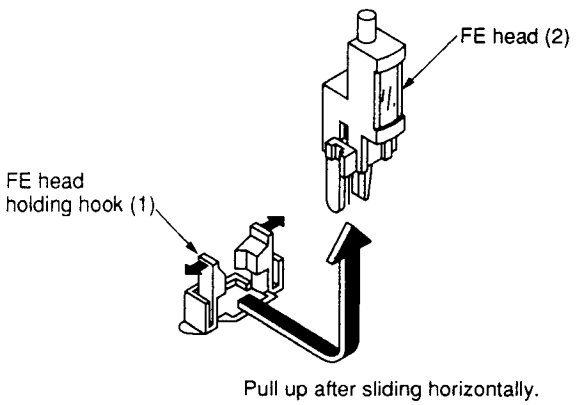


Fig. 6-16-1

1-6-17. S, T Slider Replacement

1. Remove the tension lever assembly. (Refer to item "1-6-22. Tension Lever Assembly Replacement".)
2. Remove the loading slider. (Refer to item "1-6-24. Loading Slider Replacement".)
3. Remove the S loading assembly. (Refer to item "1-6-23. S Loading Assembly Replacement".)
4. Remove the T loading assembly. (Refer to item "1-6-23. T Loading Assembly Replacement".)
5. Remove the S slider (1) and T slider (2) lifting up to the cutout of the groove on the mechanical deck (3).
6. Remove the S and T guide rollers and mount a new slider.
7. Mount the parts in the reverse order of removal.

Note:

Perform the phase alignment between the loading slider (4) and S, T loading assemblies (5), (6) referring each replacement procedure.

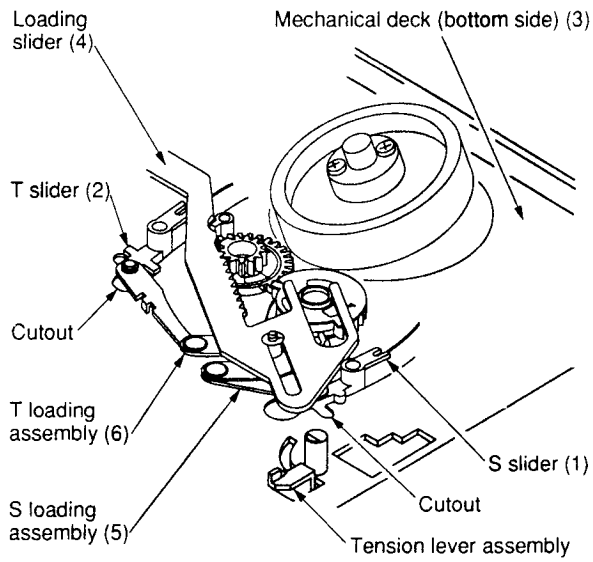


Fig. 6-17-1

8. After completion of the replacement, perform the adjustment from item 1 in the tape transport system adjustment.

1-6-18. S, T Guide Rollers Replacement

The same replacement procedures will be applied for the S, T guide rollers.

1. Turn the guide roller (1) counterclockwise and remove the guide roller (1) from the slider assembly (2).
2. Mount a new guide roller on the slider assembly (2) turning clockwise.
3. After completion of the replacement, perform the adjustment from the linearity adjustment in the tape transport system adjustment.

Note:

- O ring is not applied to the T guide roller.
- For the T guide roller, marking is located on the upper flange. So take care not to mis-mount with the S guide roller.

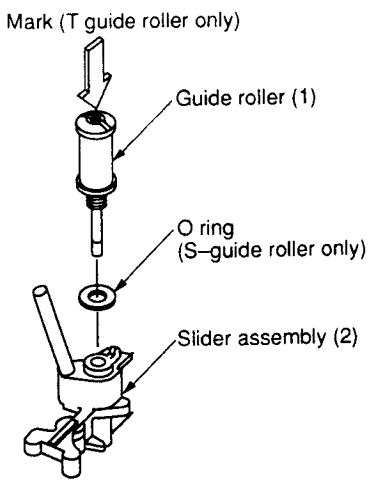


Fig. 6-18-1

1-6-19. S, T Impedance Roller Replacement

1. Remove two screws (1) and (2), and then remove two brackets (3), (4).
2. Replace two impedance rollers (5), (6).
3. Mount the parts in the reverse order of removal.
4. After completion of the replacement, perform the adjustment from the linearity adjustment in the tape transport system adjustment.

Note:

- S, T impedance rollers (5), (6) is not always applied to all models.

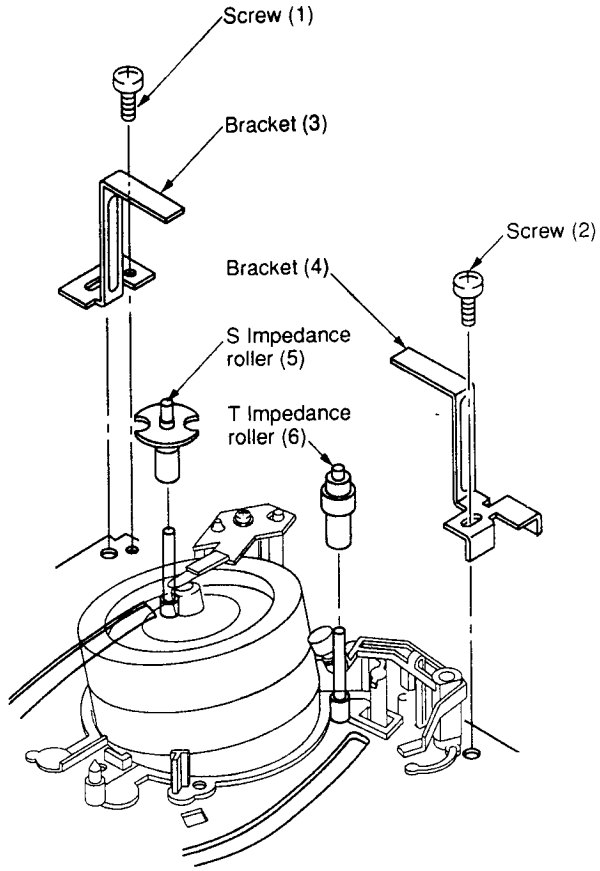


Fig. 6-19-1

1-6-20. Pinch Roller Assembly Replacement

1. Remove the loading drive assembly (Refer to item "1-6-28. Loading Drive Assembly Replacement".)
2. Remove the pinch assembly (1) lifting vertically from the pinch post (2).
3. Remove the pinch spring (5) from the hooks on the pinch drive assembly (3) and the pinch lever assembly (4).
4. Turn the projection (A) on the pinch drive assembly (3) counterclockwise till it goes to the cutout on the pinch lever assembly (4).
5. After replacing, mount the parts in the reverse order of removal.
6. After completion of the replacement, perform the tape transport adjustment.

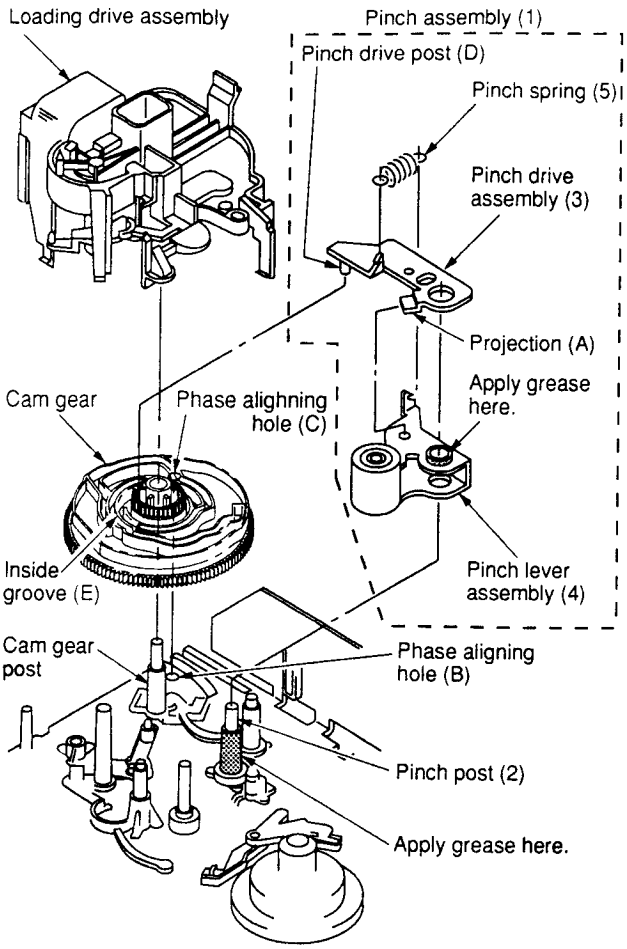


Fig. 6-20-1

Note:

- For the removal and assembling of the loading drive assembly, refer to item 1-6-28.
- When inserting the pinch assembly (1) into the pinch post (2), insert it so that the pinch drive post (D) enters the groove (E) inside the cam gear.
- Take care not to touch the surface of the pinch roller and the grease is not stained on it.
- Be sure to apply grease to the surface of the bar-ring on the pinch lever assembly (4) and the pinch post (2) on the mechanical deck.

1-6-21. No. 9 Guide Lever Assembly Replacement

1. Remove the loading drive assembly. (Refer to item "1-6-28. Loading Drive Assembly Replacement".)
2. Remove the drive lever. (Refer to item "1-6-39. Drive Lever Replacement".)
3. Remove the pinch assembly. (Refer to item "1-6-20. Pinch Roller Assembly Replacement".)
4. Remove the ACE head assembly. (Refer to item "1-6-15. ACE Head Assembly Replacement".)
5. Remove the cam gear (2) from the cam gear post (1).
6. Remove the T soft brake spring (3).
7. Remove the No. 9 guide lever assembly (4) lifting the No. 9 guide lever assembly upward from the No. 9 guide post (5).
8. After replacing, mount the parts in the reverse order of removal.
9. After completion of the replacement, perform the tape transport adjustment.

Note:

- When mounting the No. 9 guide lever assembly (4), confirm that (A) side of the No. 9 guide lever assembly (4) touches the capstan motor housing portion.
- After inserting the No. 9 guide lever assembly (4) into the No. 9 guide post (5), confirm that the lower projection of the No. 9 guide lever assembly (4) touches to the upper surface of the mechanical deck.
- Take care that the grease is not stained on the No. 9 guide post of the No. 9 guide lever assembly (4).
- Be sure to apply grease to the No. 9 guide post (5).

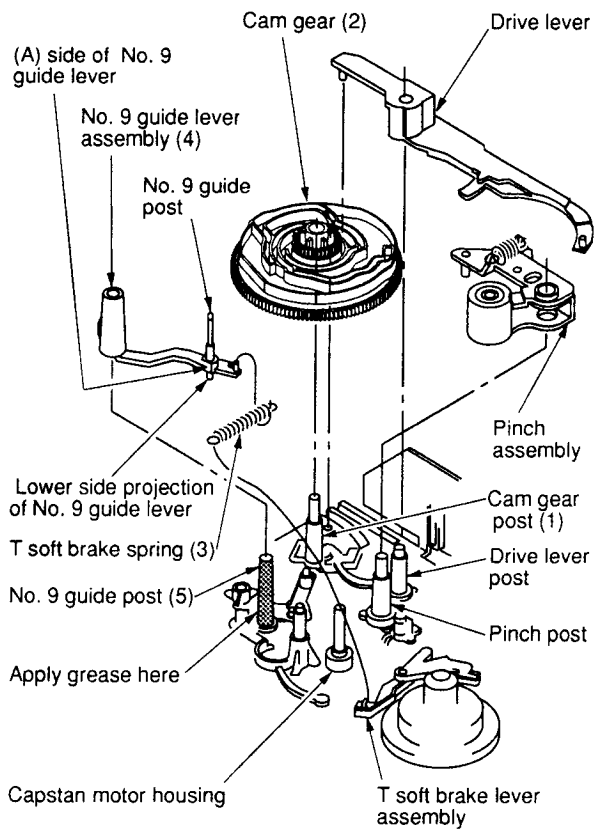

Cam gear (2)
Drive lever
(A) side of No. 9 guide lever
No. 9 guide lever assembly (4)
No. 9 guide post
Pinch assembly
Lower side projection of No. 9 guide lever
Cam gear post (1)
T soft brake spring (3)
Drive lever post
No. 9 guide post (5)
Pinch post
Apply grease here
Capstan motor housing
T soft brake lever assembly

Fig. 6-21-1

1-6-22. Tension Lever Assembly, Band Holder and Band Brake Replacement

1. Remove the tension spring (1).

Note:

- Take care not to extend or deform the tension spring.

2. After setting the band brake adjuster to the band holder assembling position, undo the claw of the snap-fit type and remove the band holder from the band brake adjuster by lifting it upward.

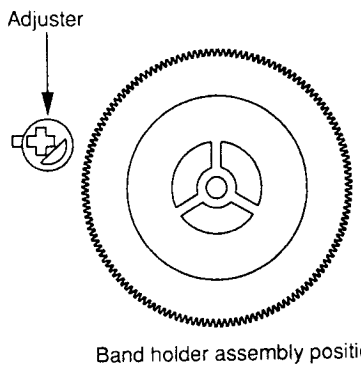


Fig. 6-22-1 Detail of band holder assembling

3. Undo the claw of the outsert on the mechanical deck catching the shaft of the tension lever assembly (3) and remove the tension lever assembly lifting it upward.
4. Remove the band brake (5) from the reel table while pulling the S soft brake lever (4) in the direction shown by the arrow.
5. Remove the band brake (5) from the hook on the tension lever assembly (3).

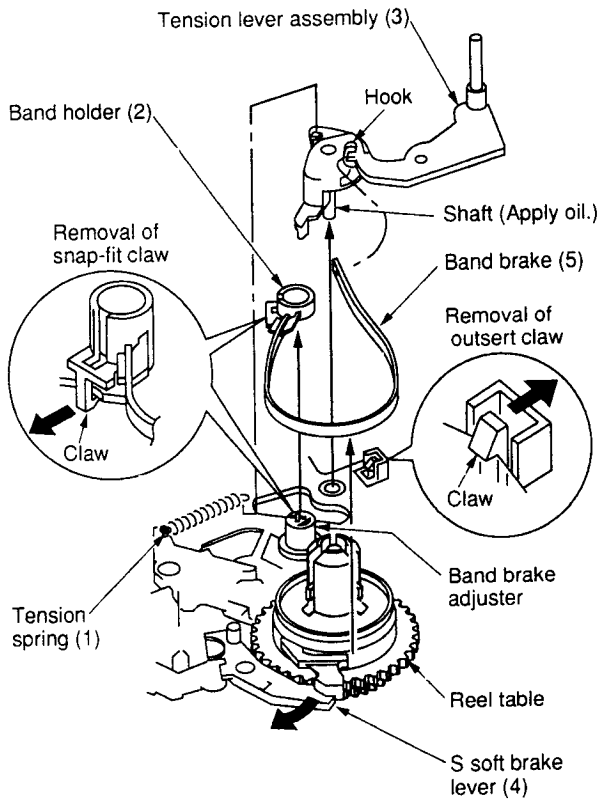
Note:

- Take care not to contaminate, bend or damage the felt surface on the band brake (5).

6. After replacing the tension lever assembly (3), clean the shaft on the tension lever and apply a few amount of oil.
7. Mount the parts in the reverse order of the removal.
8. After mounting, check the tension post position and perform the adjustment and back tension check.
9. After completion of the replacement, perform the adjustment from the linearity adjustment in the tape transport system adjustment.

Note:

- The band holder (2) can be replaced in the procedures described above steps 1 to 3.
- The band brake (5) can be replaced in the procedures described above steps 1 to 5.
- When replacing the band holder (2) and band brake (5), the linearity adjustment is not necessary.



1-6-23. S,T Loading Assembly Replacement

1. Remove the mechanical deck assembly from the main PC board.
2. Set the mechanical position to the F/L out position (front side). Turn over the mechanical deck.
3. Remove the loading slider assembly. (Refer to item "1-6-24. Loading Slider Assembly Replacement".)

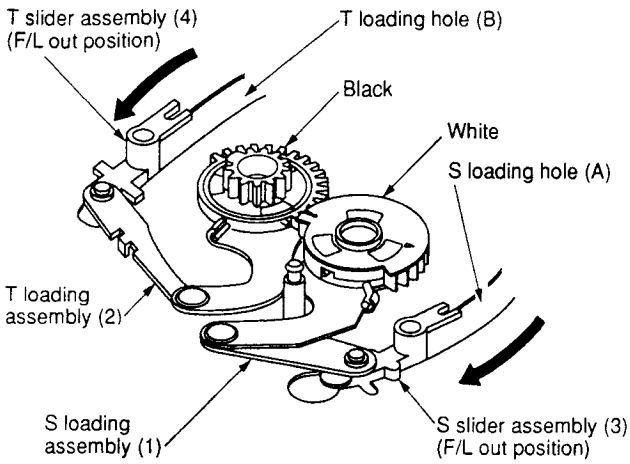


Fig. 6-23-1

4. Remove the S, T loading assemblies (1), (2).
5. Insert the S, T slider assemblies (3), (4) along the cutout of the S, T loading holes (A) and (B) on the mechanical deck and set the S, T slider assemblies (3), (4) to the loading position (rear side).
6. Insert the T loading assembly (2) to the post (C) on the T slider assembly (4) and the post (D) on the mechanical deck. And insert the S loading assembly (1) to the post (E) on the S slider assembly (3) and the post (F) on the mechanical deck.

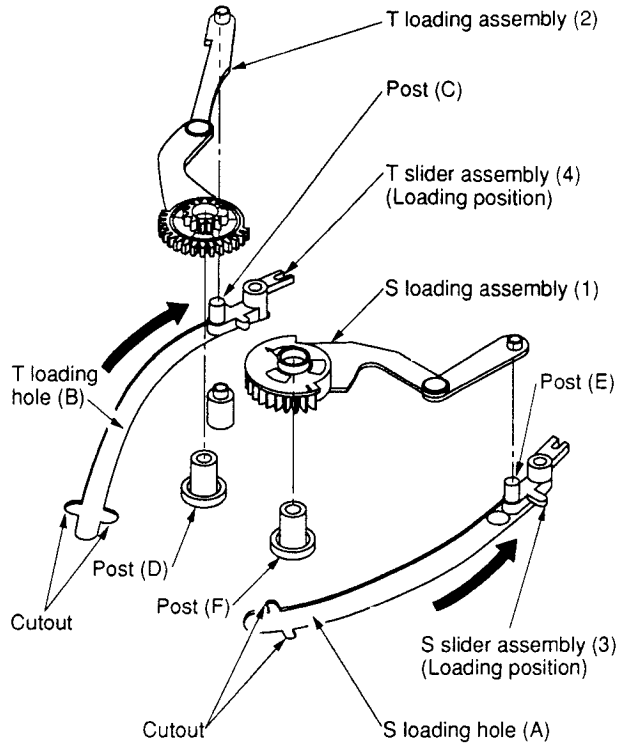


Fig. 6-23-2

Note:

- Align the phases of the ▲ marks on the S, T loading gear (1), (2).

7. Set the S, T slider assemblies (3), (4) to the F/L out position.

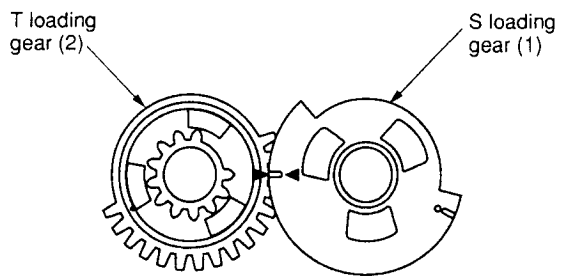


Fig. 6-23-3

1-6-24. Loading Slider Assembly Replacement

1. Remove the mechanical deck from the main PC board.
2. Set the mechanical position to the F/L out position.
3. Turn over the mechanical deck.
4. Remove the stop ring (1).
5. Remove the loading slider assembly (2) while lifting its tip upward using the mold portion on the loading slider assembly (2) as a fulcrum.
6. Mount the parts in the reverse order of removal.

Note:

- When mounting the loading slider assembly (2), insert the tip of the loading slider assembly (2) slightly to the mold portion, then mount it so that the claw on the outsert is in the position of the cutout portion of the loading slider assembly.
- Confirm that the position mark on the loading slider assembly (2) and the mark on the T loading gear match each other in position.

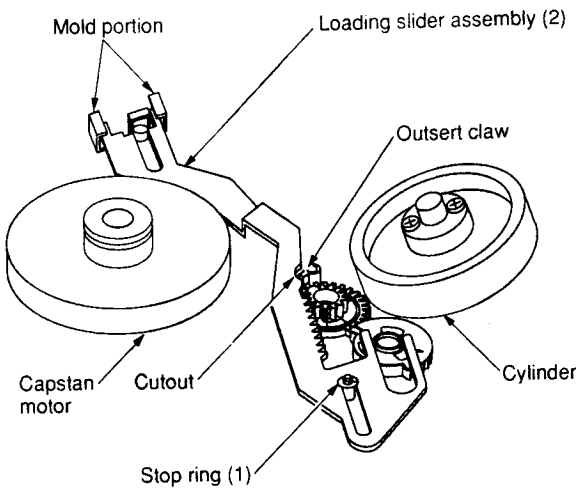


Fig. 6-24-1 View from Mechanical deck bottom side

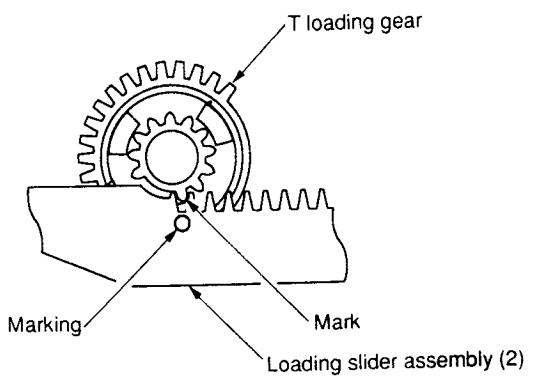


Fig. 6-24-2

1-6-25. Hook Lever Assembly Replacement

1. Remove the top bracket. (Refer to item "1-6-1. Top Bracket Replacement".)
2. Remove the cassette holder assembly. (Refer to item "1-6-2. Cassette Holder Replacement".)
3. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
4. Remove the tension spring (1).
5. Turn the hook lever assembly (2) counterclockwise slightly, and remove the claw on the hook lever assembly (2) then replace.
6. After replacing the hook lever assembly (2) , insert the (A) portion of the hook lever under the S reel table assembly. When the portions (B), (C), (D) are in line, push the claw into the mechanical deck.

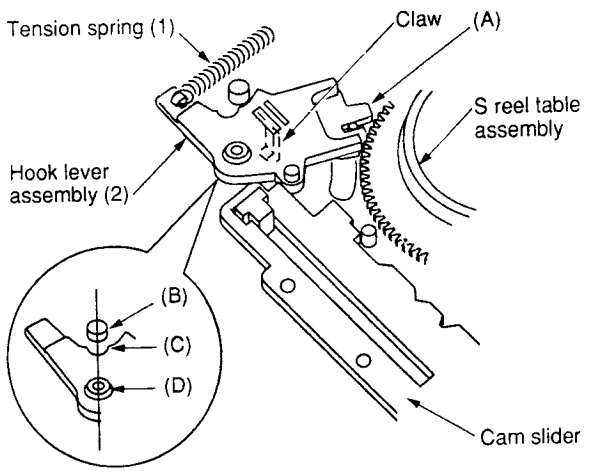


Fig. 6-25-1

7. Turn the hook lever assembly (2) clockwise till it stops, and mount the tension spring (1). After replacing the hook lever assembly (2), slide the cam slider in the direction shown by the arrow, and then position the boss (E) under the cam slider.

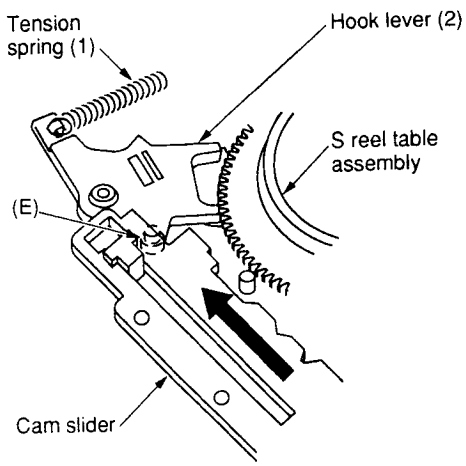


Fig. 6-25-2

1-6-26. Hook Replacement

1. Remove the hook lever assembly. (Refer to item "1-6-25. Hook Lever Assembly Replacement".)
2. Turn over the hook lever assembly (1) and remove the hook lever assembly (1) opening the portion (A) of the hook (2) slightly and lifting the hook (2) upward.
3. When mounting a new hook, push the hook (2) in the portion (B) from above.

Note:

- Take care not to confuse the mounting direction of the hook (2).

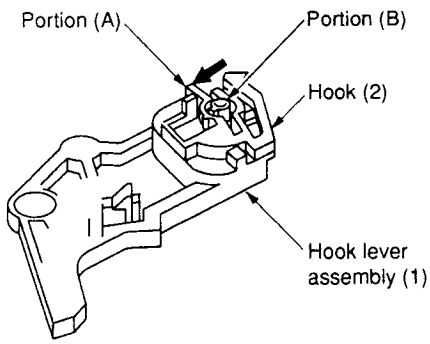


Fig. 6-26-1

1-6-27. Tension Drive Lever Replacement

1. Remove the cam slider. (Refer to item "1-6-40. Cam Slider Replacement".)
2. Turn over the mechanical deck and remove the tension drive lever (1) from the projection (A) moving counterclockwise slightly.
3. After replacing the tension drive lever (1), mount in the reverse order of removal.

Note:

- For the cam slider mounting, refer to the notes in item 1-6-40.

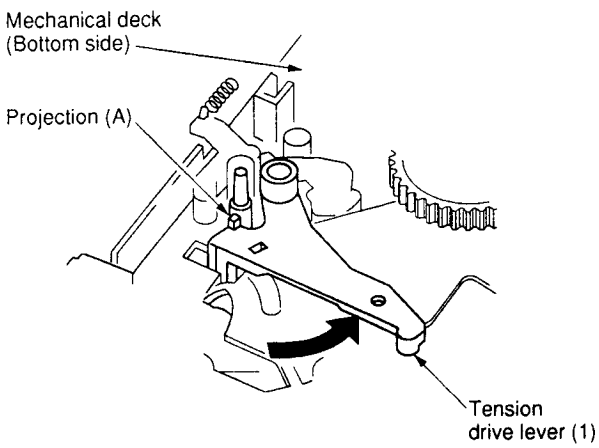


Fig. 6-27-1

1-6-28. Loading Drive Assembly Replacement

1. Remove the F/L ground plate and the head cleaner assembly. (Refer to item "1-6-13. Head Cleaner Assembly Replacement".)
2. Remove two flat cables (1) from the connectors.
3. Pull out the portion (A) (No. 8 guide cap) from the motor bracket (2).
4. Remove four claws (a), (b), (c), (d) securing the motor bracket in the order of (a) → (b) → (c) → (d).

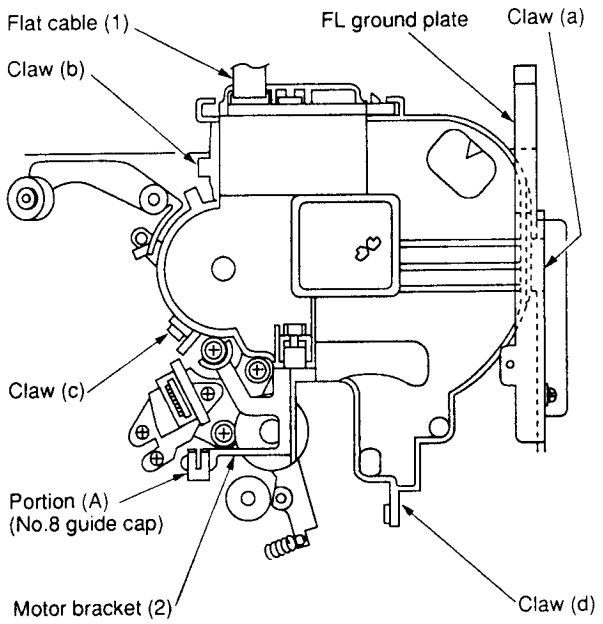


Fig. 6-28-1

Note:

- Remove the claw (a) inserting a driver.
- Remove the claws (b) and (c) pushing inside previously and opening the claws slightly.

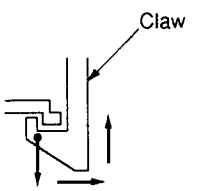


Fig. 6-28-2

<Preparation for Loading drive assembly mounting >

a) Confirm that the head cleaner assembly is removed.

b) Confirm that the small hole b) on the cam gear aligns with the hole on the mechanical deck.

c) Confirm that the clearance between the pinch lever assembly and the cam gear is approx. 0.3 mm. (Confirm that the pinch lever assembly is correctly mounted on the groove of the cam gear.)

d) Confirm that the clearance between the drive lever and the cam gear is approx. 2 mm. (Confirm that the drive lever is correctly mounted on the groove of the cam gear.)

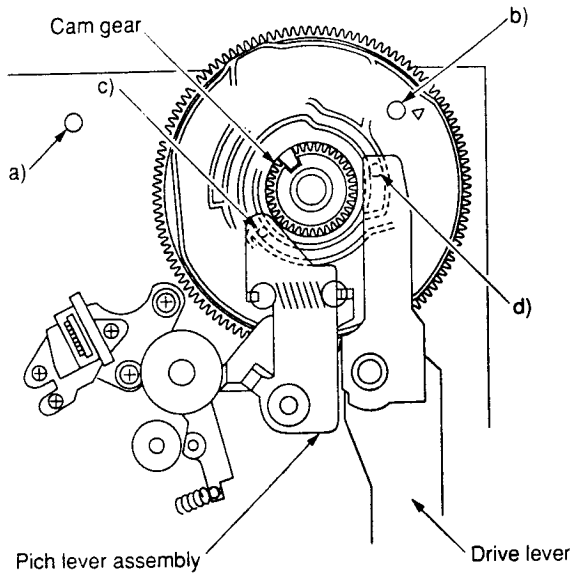
e) Confirm that the Δ mark on the rotor of the cam switch aligns with the Δ mark on the motor bracket.

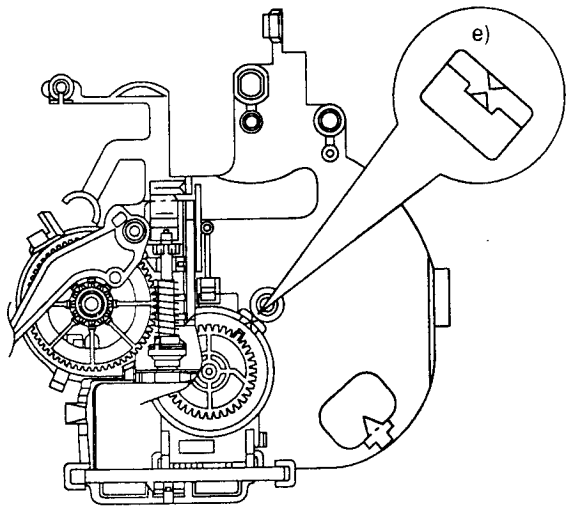
5. After completion above steps a) to e), mount the loading drive assembly. Push four claws to the motor bracket in the order of (d) → (c) → (b) → (a) and push the portion (A) (No. 8 guide cap) into the motor bracket.

6. Confirm that the Δ mark on the rotor of the cam switch aligns with that on the bracket when the hole b) on the cam gear aligns with the hole on the mechanical deck. If the alignment of the Δ marks cannot be confirmed, remove loading drive assembly once again and reinstall after confirming the above steps a) to e).

7. Mount two flat cables.

8. Mount the F/L ground plate and the head cleaner assembly.



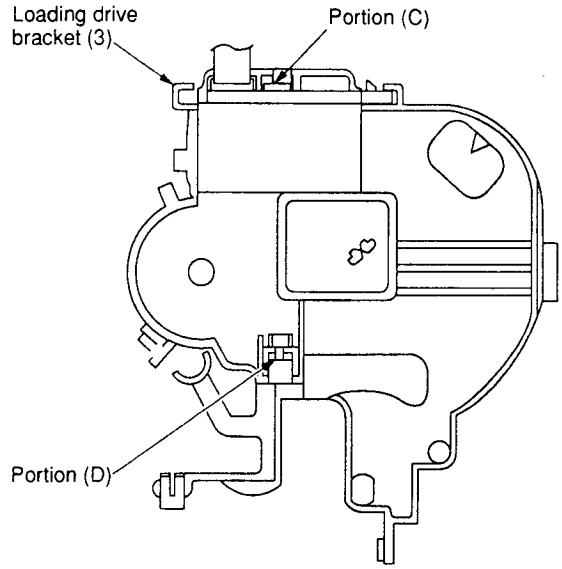


Loading drive assembly bottom side

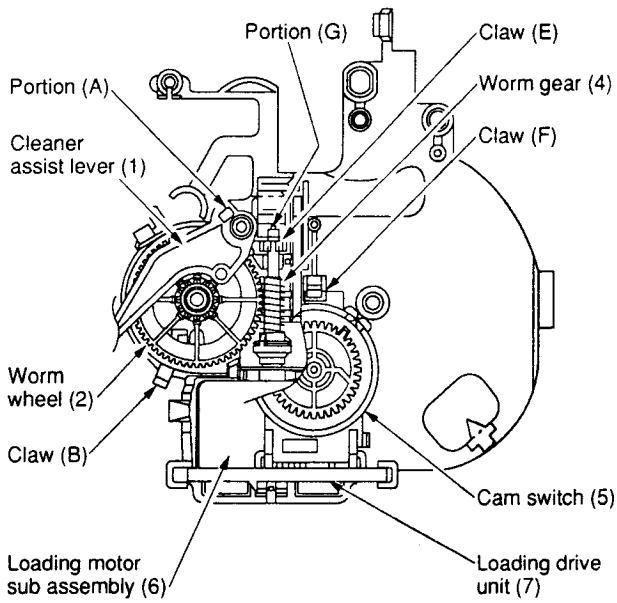
Fig. 6-28-3

1-6-29. Loading Motor Sub Assembly, Cam Switch and Loading Drive Unit Replacement

1. Remove the loading drive assembly. (Refer to item "1-6-28. Loading Drive Assembly Replacement".)
2. Remove the cleaner assist lever (1) from the claw (A).
3. After removing the cleaner assist lever (1), the worm wheel can be also removed upward.
4. Insert a slot-type screwdriver into the portion (C) of the loading drive bracket (3) and push the loading motor 2 – 3 mm lower. And push the tip of worm gear from the portion (D) of the loading bracket (3), then remove the worm gear (4) from the claw (E).
5. Remove the cam switch (5) from the claw (F) on the loading drive bracket (3) and pull out the loading drive unit (7) and the worm gear (4) simultaneously.
6. Replace the loading drive unit (7). When mounting the PC boards of the cam switch (5) and the loading drive unit (7), take care that no clearance is allowed.
7. Insert the loading drive unit (7) and the worm gear (4) into the loading drive bracket (3).
8. Push the tip (G) of the worm gear (4) into the claw (E) on the loading motor bracket.
   In this process, take care not to bend the tip of the worm gear with strong pressure.
9. Push the cam switch (5) into the claw (F) on the loading motor bracket.
10. Mount the parts in the reverse order of removal.



Loading drive assembly (Top Side)



Loading drive assembly (Bottom side)

Fig. 6-29-1

1-6-30. Cam Gear Replacement

1. Remove the loading drive assembly. (Refer to item "1-6-28. Loading Drive Assembly Replacement".)
2. Remove the cam slider. (Refer to item "1-6-40. Cam Slider Replacement".)
3. Remove the drive lever. (Refer to item "1-6-39. Drive Lever Replacement".)
4. Remove the pinch roller assembly. (Refer to item "1-6-20. Pinch Assembly Replacement".)
5. Remove the cam gear.
6. Apply grease on a new cam gear on the shaded portion as shown in Fig. 6-30-1 and the shaft of the main base.

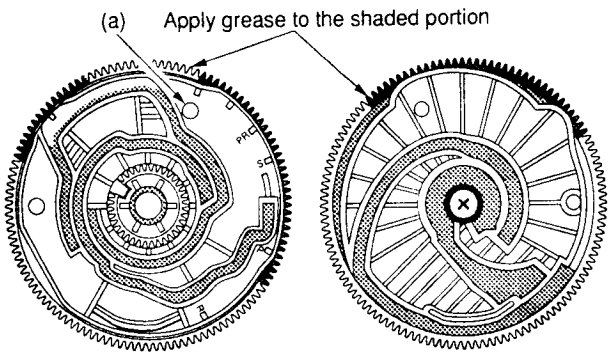


Fig. 6-30-1

7. Make the S, T slider to the slot out condition.
8. Push the cam lever (1) and the pin (2) (loading slider) in the direction shown by the arrows (A) and (B).
9. Mount the cam gear at the angle which the small hole (a) on the cam gear aligns with the hole on the mechanical deck. (Refer to Fig. 6-30-1.)

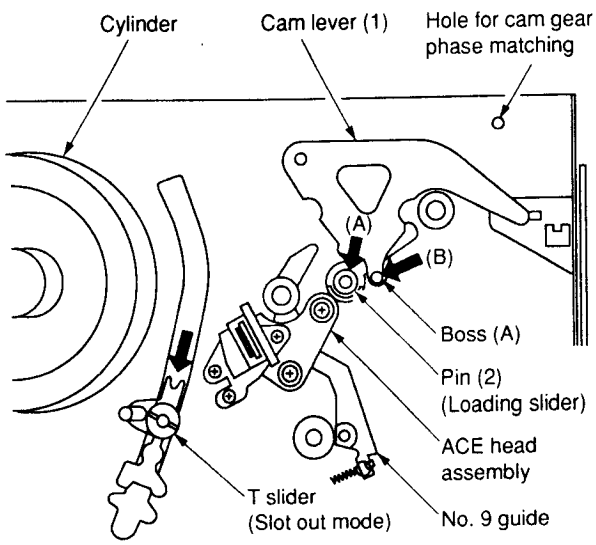


Fig. 6-30-2

10. Mount the parts in the reverse order of removal.

1-6-31. S Reel Table Assembly and Washer 2 Replacement

1. Remove the top bracket and the cassette holder assembly. (Refer to item "1-6-1. Top Bracket Replacement and 1-6-2. Cassette Holder Assembly Replacement".)
2. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
3. Remove the cam slider. (Refer to item "1-6-40. Cam Slider Replacement".)
4. Remove the S soft brake and S main brake assembly. (Refer to item "1-6-37. S Soft Brake Replacement and 1-6-36. S Main Brake Assembly Replacement".)
5. Remove the tension lever assembly. (Refer to item "1-6-22. Tension Lever Assembly Replacement".)
6. Remove the S reel table assembly (1) pulling it out upward.
7. Remove the washer 2 (2).
8. After cleaning the reel shaft (3) with a cleaning kit, insert a new washer 2 (2) to the reel shaft (3) and apply a drop of oil to the shaded portions (two locations) on the reel shaft (3).
9. After replacing, mount the parts in the reverse order of removal.
10. Confirm the reel torque using a torque cassette.

Note:

- The washer 2 (2) can use repeatedly.

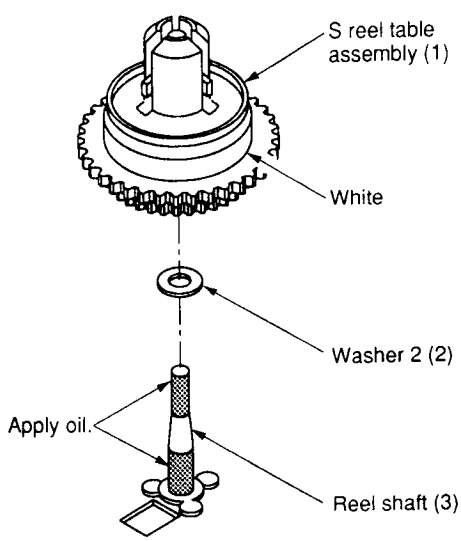


Fig. 6-31-1

1-6-32. T Reel Table Assembly and Washer 2 Replacement

1. Remove the top bracket and the cassette holder assembly. (Refer to item "1-6-1. Top Bracket Replacement and 1-6-2. Cassette Holder Assembly Replacement".)
2. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
3. Remove the T soft brake and T main brake assembly (Refer to item "1-6-40. Cam Slider Replacement".)
4. Remove the T reel table assembly (1) pulling it out upward.
5. Remove the washer 2 (2).
6. After cleaning the reel shaft (3) with a cleaning kit, insert a new washer 2 (2) to the reel shaft (3) and apply a drop of oil to the shaded portions (two locations) on the reel shaft (3).
7. After replacing, mount the parts in the reverse order of removal.
8. Confirm the reel torque using a torque cassette.

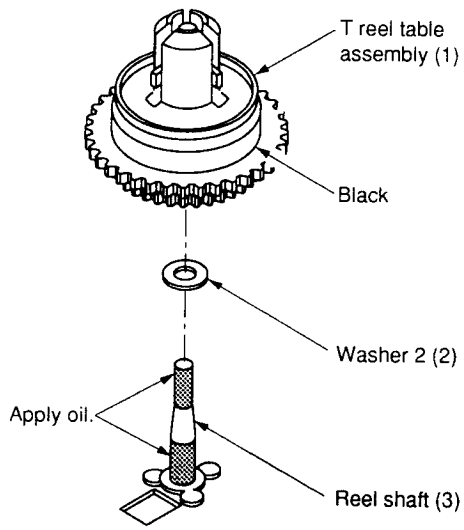


Fig. 6-32-1

Note:

- Washer 2 (2) can use repeatedly.

1-6-33. Idle Arm Assembly Replacement (Center Gear Pulley, Idle Kick Lever, Idle up/down Lever)

1. Remove the mechanical deck from the main PC board.
2. Remove the stop ring (1) turning over the mechanical deck.
3. Remove the center gear pulley (2) lifting it upward.
4. Remove the claw (A) on the idle kick lever (3) moving and pulling it upward.
5. Remove the slit washer (4).
6. Remove the idle up/down lever (5) and the idle arm (6) simultaneously from two claws (B) on the mechanical deck.
7. After cleaning the center gear post (7) using a cleaning kit, apply a few drops of oil to the shaded portion on the center gear post.
8. Mount the parts in the reverse order of removal.

Note:

- Stop ring (1) is impossible to use again.
- When mounting the parts, take care of the notice shown in Fig. 6-33-2.

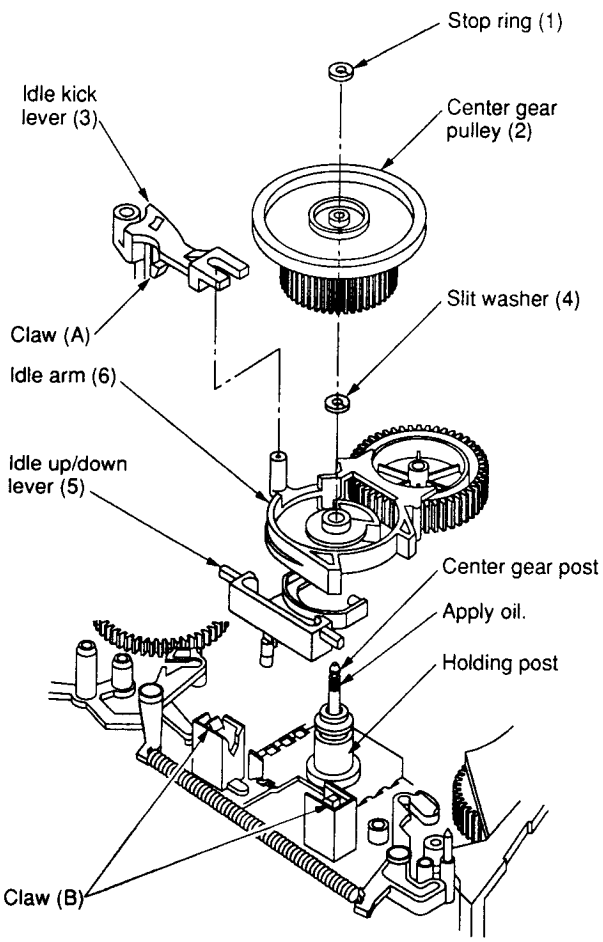


Fig. 6-33-1

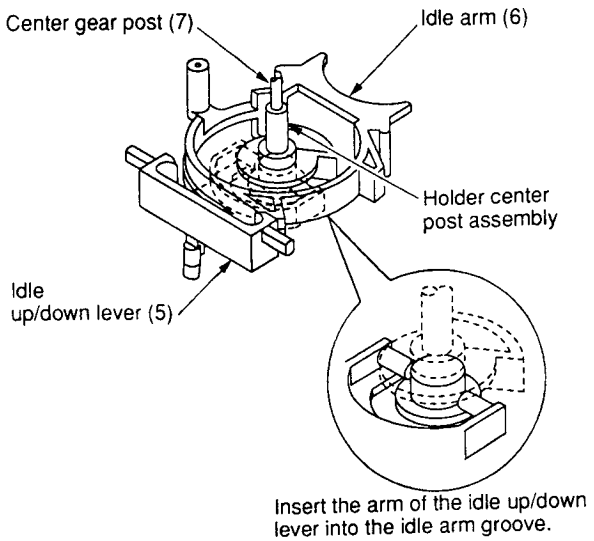

Center gear post (7)
Idle arm (6)
Holder center post assembly
Idle up/down lever (5)
Insert the arm of the idle up/down lever into the idle arm groove.

Fig. 6-33-2

1-6-34. Holder Center Post Assembly Replacement

1. Turn over the mechanical deck and remove the center gear pulley and the idle arm. (Refer to item "1-6-33. Idle Arm Assembly Replacement".)
2. Turn over the mechanical deck and remove the top bracket and the cassette holder assembly. (Refer to item "1-6-1. Top Bracket Assembly Replacement and 1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
4. After removing two screws (1), replace the holder center post assembly (2).
5. After replacing, mount the parts in the reverse order of removal.

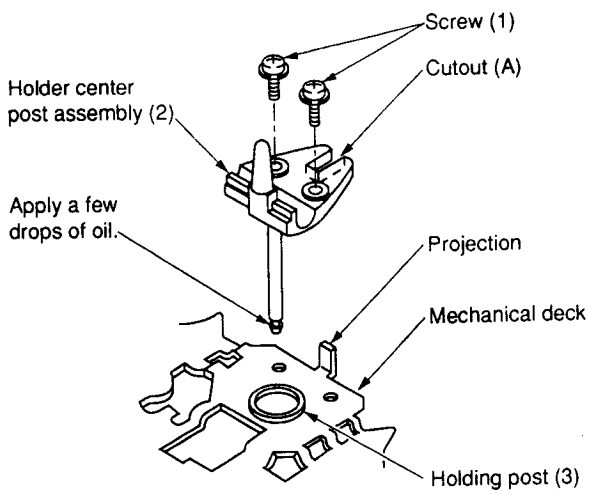


Fig. 6-34-1

Note:

- When mounting, push the cutout (A) on the holder center post assembly (2) aligning with the projection on the mechanical deck.
- Screw tightening torque is 294 – 392 mN•m (3 – 4 kg•cm).
- Before mounting the center gear pulley, apply a few drops of oil. (Refer to Fig. 6-33-1.)

1-6-35. REC Inhibiting Lever Replacement

1. Remove the top bracket. (Refer to item "1-6-1. Top Bracket Replacement".)
2. Remove the cassette holder assembly. (Refer to item "1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the cam slider. (Refer to item "1-6-40. Cam Slider Replacement".)
4. Remove the tension spring (2).
5. Undo the claw (A) on the S soft brake (1) sliding and lifting it upward.
6. Remove the projection (B) on the REC inhibiting lever (3) sliding in the direction shown by the arrow and lifting it upward.
7. After replacing the REC inhibiting lever (3), mount the parts in the reverse order of removal.

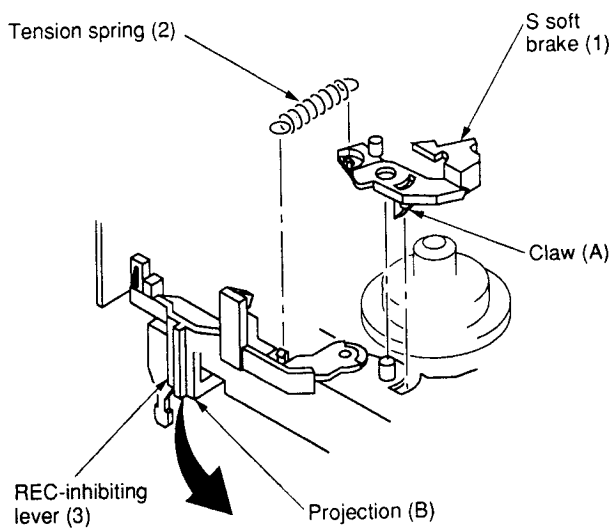


Fig. 6-35-1

1-6-36. S, T Main Brake Assembly Replacement

1. Remove the mechanical deck from the main PC board and turn the mechanical deck upside down.
2. When replacing the T main brake assembly (2), first remove the idle kick lever (3). (Refer to item "1-6-33. Idle Arm Assembly Replacement".)
3. Remove the tension spring (4).
4. Remove the claws on the S, T main brakes (1), (2) from the mechanical deck lifting the S, T main brakes (1), (2) upward.
5. After replacing the S, T Main brake assemblies (1), (2), mount the parts in the reverse order of removal.

Note:

- When mounting the S, T main brake assemblies (1), (2) take care that both ends of the S, T main brakes (1), (2), do not touch the gear of the reel table.

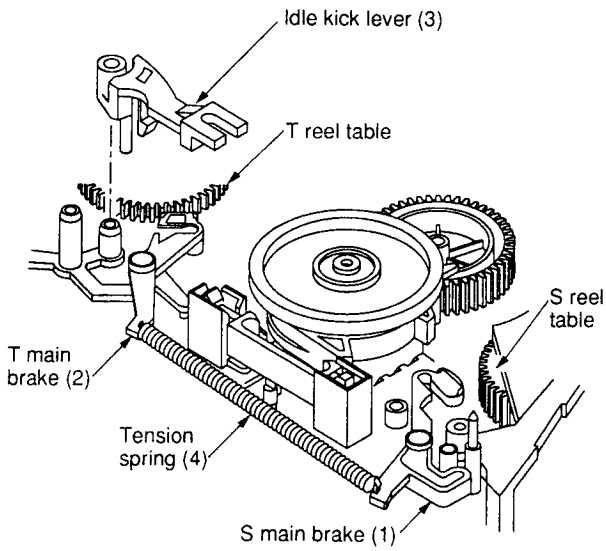


Fig. 6-36-1

1-6-37. S Soft Brake Replacement

1. Remove the cam slider. (Refer to item "1-6-40. Cam Slider Replacement.")
2. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
3. Remove the S soft brake spring (1).
4. Remove the S soft brake (2) after removing the claw (A) on the S soft brake from the mechanical deck.

Note:

- When mounting the S soft brake spring (1), take care not to deform the hook (B).
- When mounting the S soft brake (2), take care of the band brake (3).

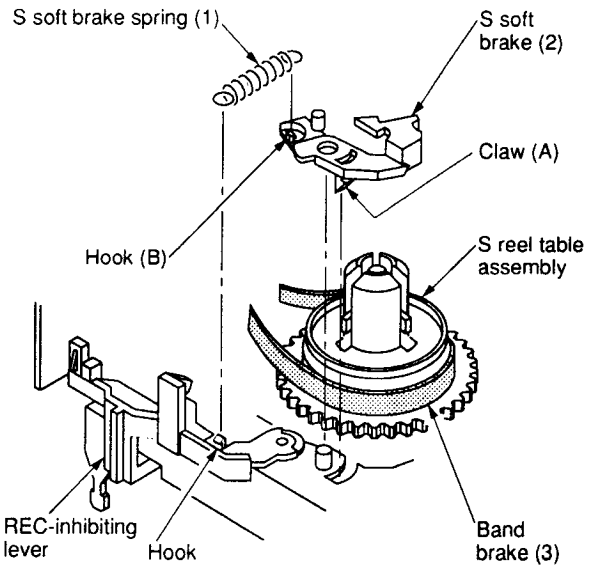


Fig. 6-37-1

1-6-38. T Soft Brake Replacement

1. Remove the T soft brake spring (1).
2. Remove the claw (A) on the T soft brake (2) from the mechanical deck and remove the T soft brake (2).
3. After replacing the T soft brake (2), mount the parts in the reverse order of removal.

Note:

- When mounting the T soft brake spring (1), take care not to deform the hook (B).
- Take care not to touch the surface (C) on the brake pad.

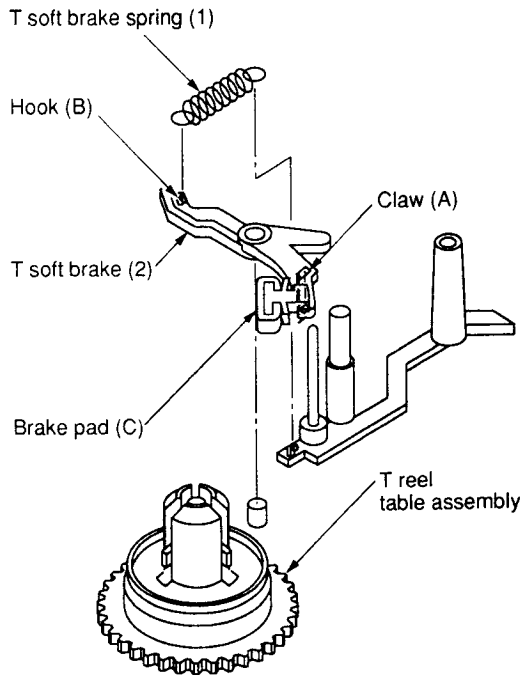


Fig. 6-38-1

1-6-39. Drive Lever Replacement

1. Remove the top bracket. (Refer to item "1-6-1. Top Bracket Replacement".)
2. Remove the cassette holder assembly. (Refer to item "1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
4. Remove the cam slider. (Refer to item "1-6-40. Cam Slider Replacement".)
5. Remove the Loading Drive Assembly. (Refer to item "1-6-28. Loading Drive Assembly Replacement.")
6. Remove the drive lever (1).
7. After replacing the drive lever (1), mount the parts in the reverse order of removal.

Note:

- Be sure to align the phase of the cam gear (2). (Refer to item 1-6-40. Cam Slider Replacement".)
- Mount the drive lever (1) so that it is positioned between the mark (A) on the mechanical deck and the outsert (B).
- Apply grease to the surface between the mark (C) on the mechanical deck and the drive lever shaft (D).

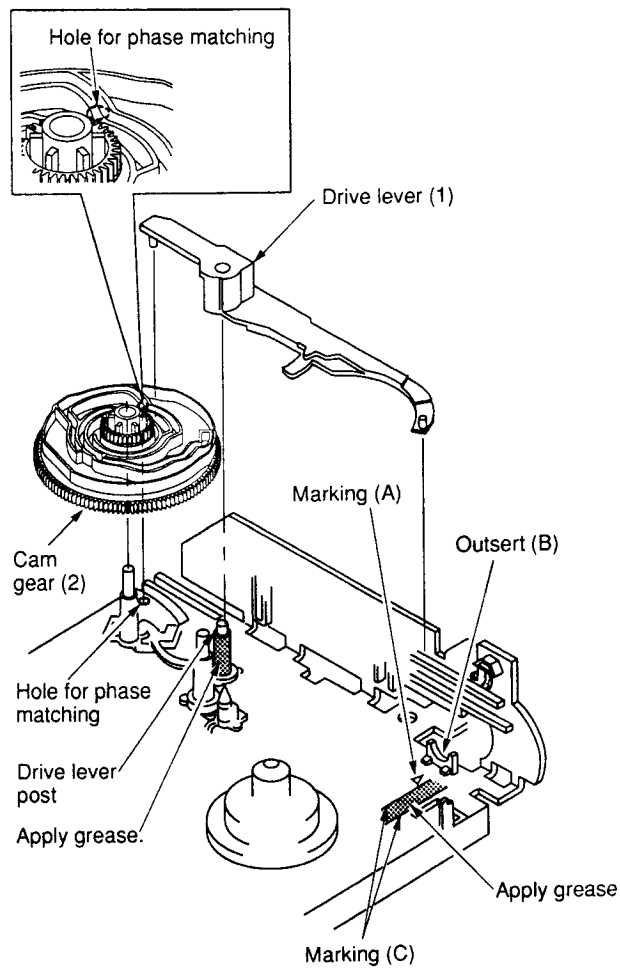


Fig. 6-39-1

M

Te

1-6-40. Cam Slider Replacement

1. Remove the top bracket and the cassette holder assembly. (Refer to item "1-6-1. Top Bracket Replacement and 1-6-2. Cassette Holder Assembly Replacement".)
2. Remove the tension spring (1).
3. Turn the hook lever assembly (2) counterclockwise and turn the S soft brake (3) counterclockwise.
4. Move the cam slider (4) to the right and align the projection (A) on the mechanical deck and the cutout portion (B) on the cam slider (4).
5. Remove the claw (C) on the cam slider (4) and remove the cam slider (4) lifting the cam slider (4) upward.

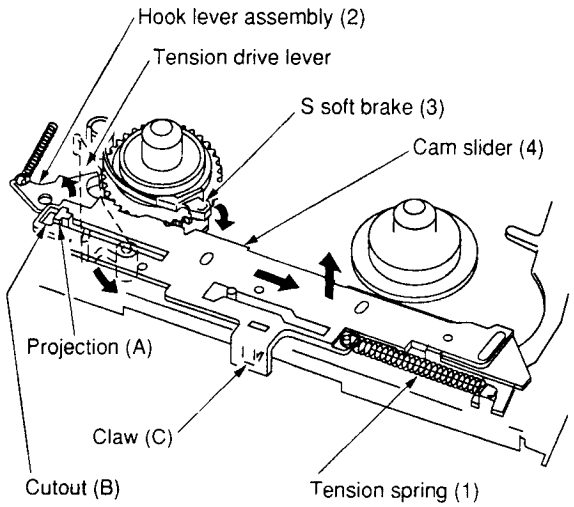
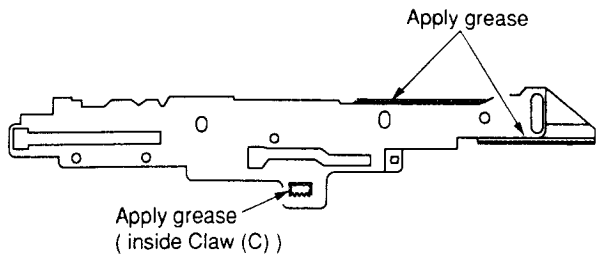


Fig. 6-40-1

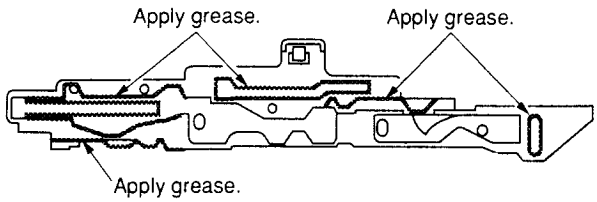
6. Apply grease on the shaded portion of a new slider for the replacement.
7. Mount the parts in the reverse order of removal. After inserting the cam slider, slide it to the left direction till it stops. (Fig. 6-25-2 shows this condition.)

Note:

- When mounting the cam slider (4), slide the tension drive lever in the direction shown by the arrow (counterclockwise).
- After completion of the replacement, confirm that the cam slider (4) can slide to left and right directions smoothly.



Cam slider top side



Cam slider bottom side

Fig. 6-40-2

1-6-41. Idle Centering Lever Replacement

1. Remove the cam slider. (Refer to item "1-6-40. Cam Slider Replacement".)
2. Remove the claw on the idle centering lever (1) and remove the idle centering lever (1) lifting it upward.
3. After replacing the idle centering lever (1), mount the part in the reverse order of removal.

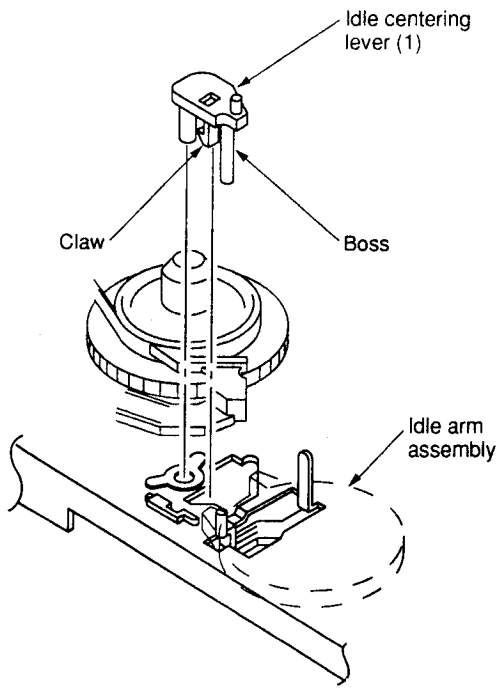


Fig. 6-41-1

1-6-42. Capstan Motor Replacement

1. Remove the reel belt (1).
2. Remove one screw (2) from the bottom of the mechanical deck, and remove the PC board (3).

Note:

- Take care not to misuse the screw with others.

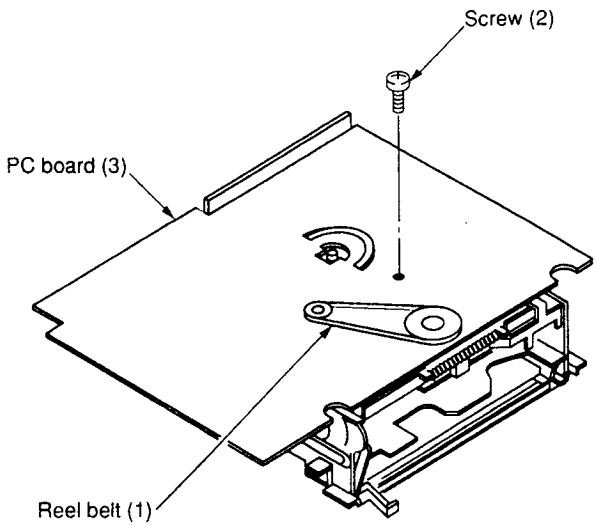


Fig. 6-42-1

3. Remove the capstan motor (4) after removing three screws (5).

Note:

- Take care not to drop the capstan motor.

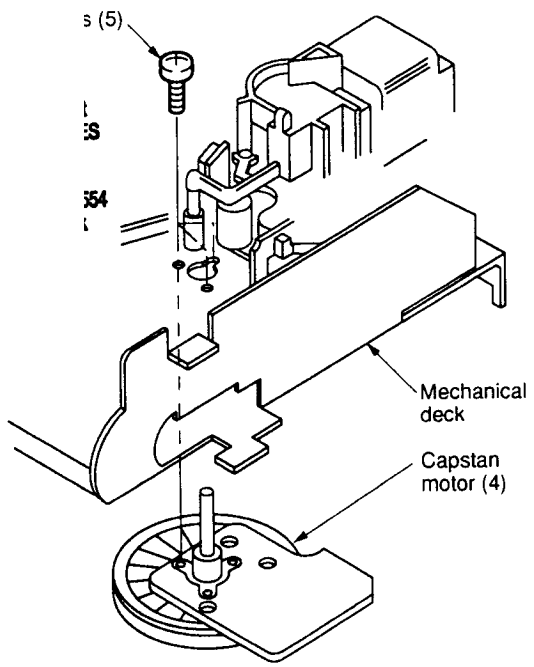


Fig. 6-42-2

4. Take care not to damage and scratch the motor itself, and mount the capstan motor (4) fitting the hole (A) on the mechanical deck and the hole (B) on the capstan motor (4).

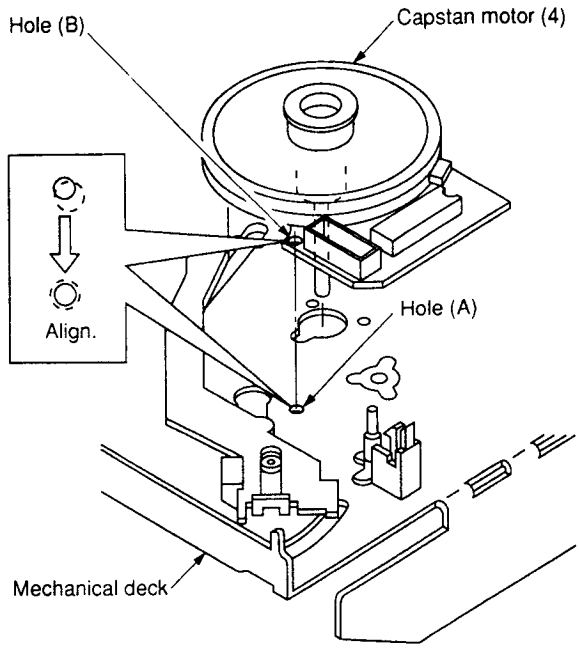


Fig. 6-42-3

5. Mount the capstan motor (4) with three screws (5) viewing from the top side of the mechanical deck.

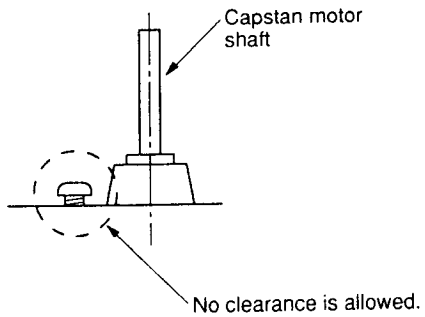


Fig. 6-42-4

Note:

- Do not use once-removed screws again.
- Take care that no clearance is allowed when securing three screws.

6. After replacement, mount the parts in the reverse order of removal.

Note:

- In this case, take care not to twist the reel belt and stick the grease or etc. on it.

7. After replacing, perform the adjustment according to the tape transport adjustment procedures.

1-6-43. S-VHS Switch Assembly Replacement (S-VHS model only)

1. Slide the cassette holder assembly (1) until the screw (2) can be seen from the hole on the top bracket (3).
2. Insert a screwdriver from the hole provided on the top bracket (3) and secure the screw (2).
3. Remove the S-VHS switch assembly (4) upward.
4. After completion of the replacement, mount the parts in the reverse order of removal.

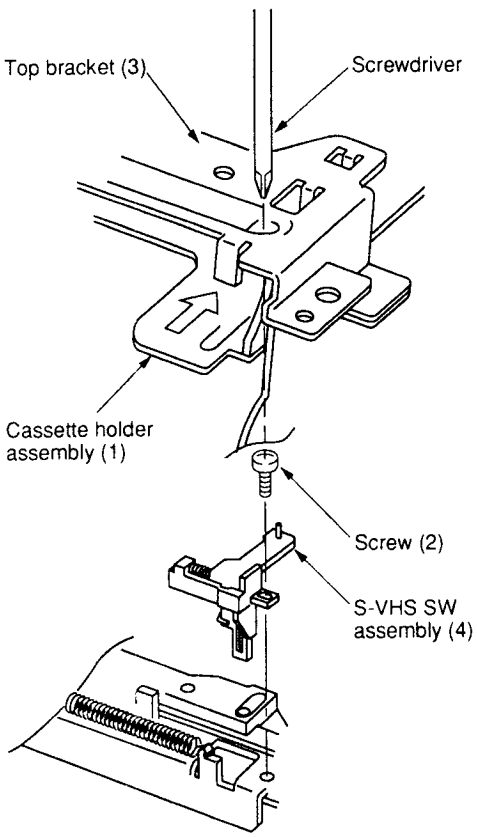


Fig. 6-43-1

1-7. Check and Adjustment

1-7-1. Check of Tension Pole Position

1. Turn the worm wheel counterclockwise after removing the cassette holder assembly on the front loading mechanism, and set the cam gear at playback position.
2. Turn the S reel table assembly (1) clockwise slowly.
3. Adjust the adjuster (3) counterclockwise from the position shown in Fig. 6-22-1 so that the clearance between the left end of the tension lever assembly (2) and the left side of the mechanical deck becomes 7.5 ± 1 mm.

Note:

- There is a long mark at the position of 7.5 mm from the round surface of the mechanical deck. Make sure the position of the mark when adjusting.

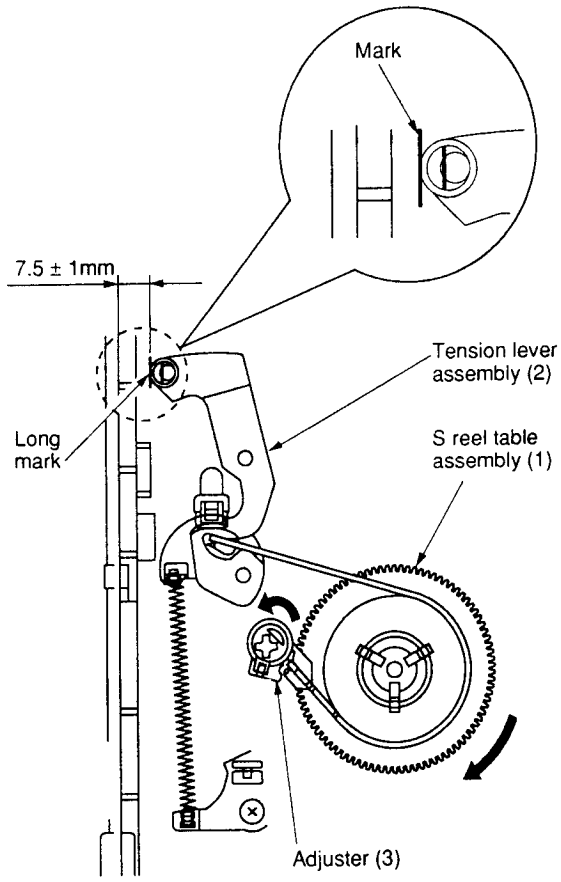


Fig. 7-1-1

1-7-2. Reel Torque Check

(1) Reel torque

1. REVIEW mode (supply side)

   Poor torque may not wind the tape. On the other hand, excessive torque will cause damage to the tape during REVIEW mode.

2. Record/Playback mode (take-up side)

   Too little torque does not rewind the tape to the end. If too large torque, the tape may be stretched by excessive tension.

3. Inspection

   Rewind the torque cassette to the end, then check the torque values shown below:

Review	15.95 ± 3.65 mN•m (162.5 ± 37.5 g•cm)
Record/Playback	6.85 ± 2.45 mN•m (70 ± 25 g•cm)

   For checking method, refer to the following item (2).

(2) Reel torque and back tension check

1. First, record a TV broadcast program on the entire torque cassette tape (KT-300NR) in the SP mode.
2. Load the torque cassette tape (KT-300NR) in the VTR and feed it forward until the end of the tape, before proceeding with measurement.
3. Set the VTR to the REVIEW mode and feed the tape for about 15s, and then make sure the take-up torque described above is obtained while observing the left torque meter.
4. After completion of step 3), feed forward to tape start position and set the VTR to the PLAY mode and feed the tape for about 30s. Read the right torque meter and check the torque described above is obtained.
5. If the review torque and playback torque are out of limit, replace the clutch assembly.
6. When the S reel table assembly, the T reel table assembly and the idle arm assembly are replaced, perform the reel torque check.

<Precautions for Use of Torque Cassette (KT-300NR)>

1. Before loading a torque cassette in a VTR, always remove tape slack. The tape slack can be removed by rotating the reel to its take-up direction. (The tape tends to slack when there is no reel brake actions.)
2. When the torque cassette is loaded, confirm followings:
   - Make sure the tape does not ride up or over the No. 8 cap. If it does, do not eject the tape but return the tape to its correct position, taking care not to damage the tape.
   - Make sure the tape is not slackened. If slackened, operate the VTR in FF or REW mode and then stop the tape. Then make sure the tape is not slackened again.
   - After above confirmation, proceed to the reel torque adjustment and confirmation.
3. Caution for removal of torque cassette
   - When removing the torque cassette from the VTR, set the VTR to the STOP mode and wait for several seconds. Then, make sure the tape is not slackened. Push the EJECT button to remove the cassette.
4. If the previous precautions 1), 2) and 3) are not performed properly, the tape may be damaged and correct measurements can not be performed.
5. Do not use worn out or damaged tape, if used they may damage video heads on the cylinder. In such a case always replace the tape with a new one. The replacement tape is of E-180, 10 m in length.

1-7-3. Tape Transport System

The tape transport system has been precisely adjusted in the factory, so no check and alignment are necessary except the followings:

- Noises observed on the screen
- Tape damage
- Parts, shown in the adjustment procedures for the tape transport system were replaced.

Electrical signal output terminal required for adjustment differs depending upon the models. Refer to the test point location in the Electrical Adjustment Section.

(1) Location of tape transport adjustment

<Adjustment reference>

Lower flange height of No. 8 guide is used as the basic reference for the transport adjustment. To keep height of the No. 8 guide, do not apply excessive force onto the main base to prevent the main base from deformation.

Rectangles shown in Figs. 7-3-1, 7-3-2 show the adjusting locations.

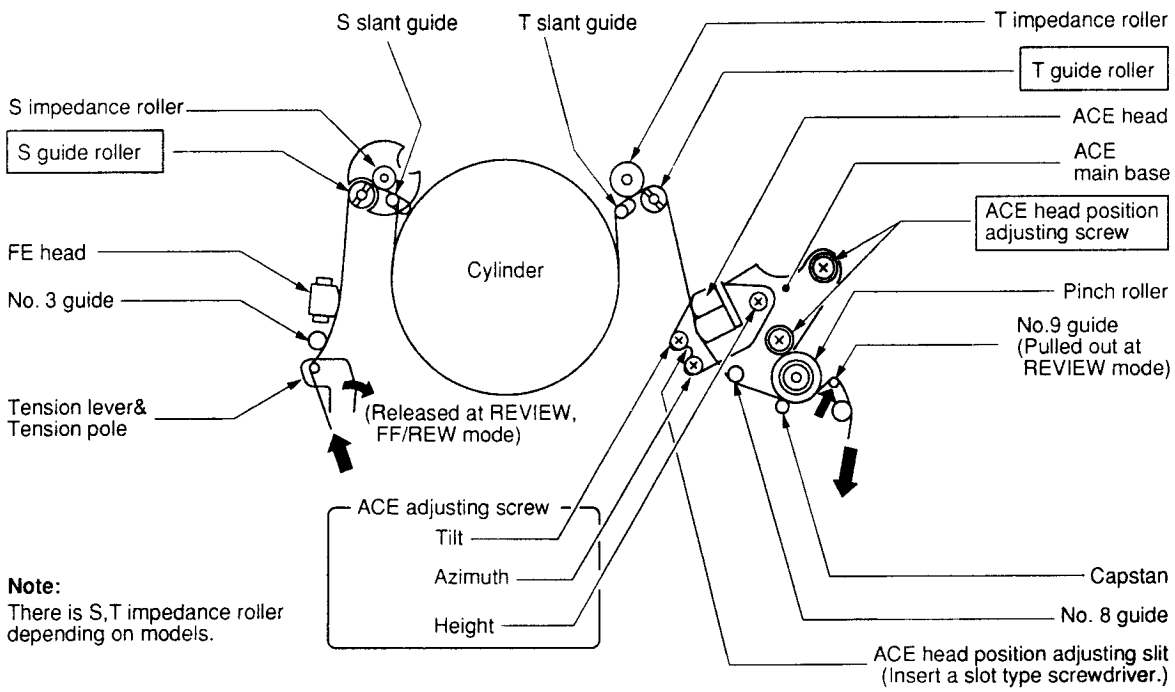


Fig. 7-3-1 Tape travel diagram

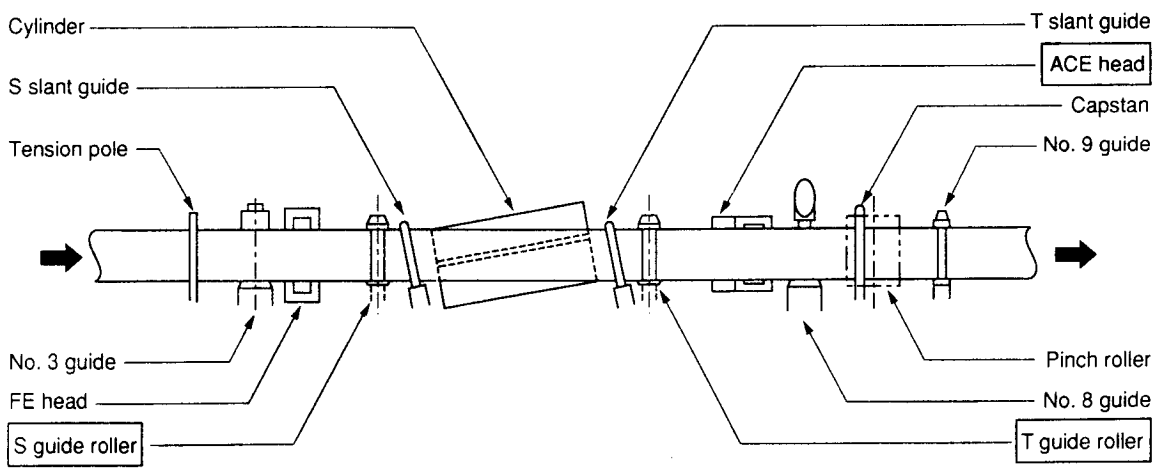
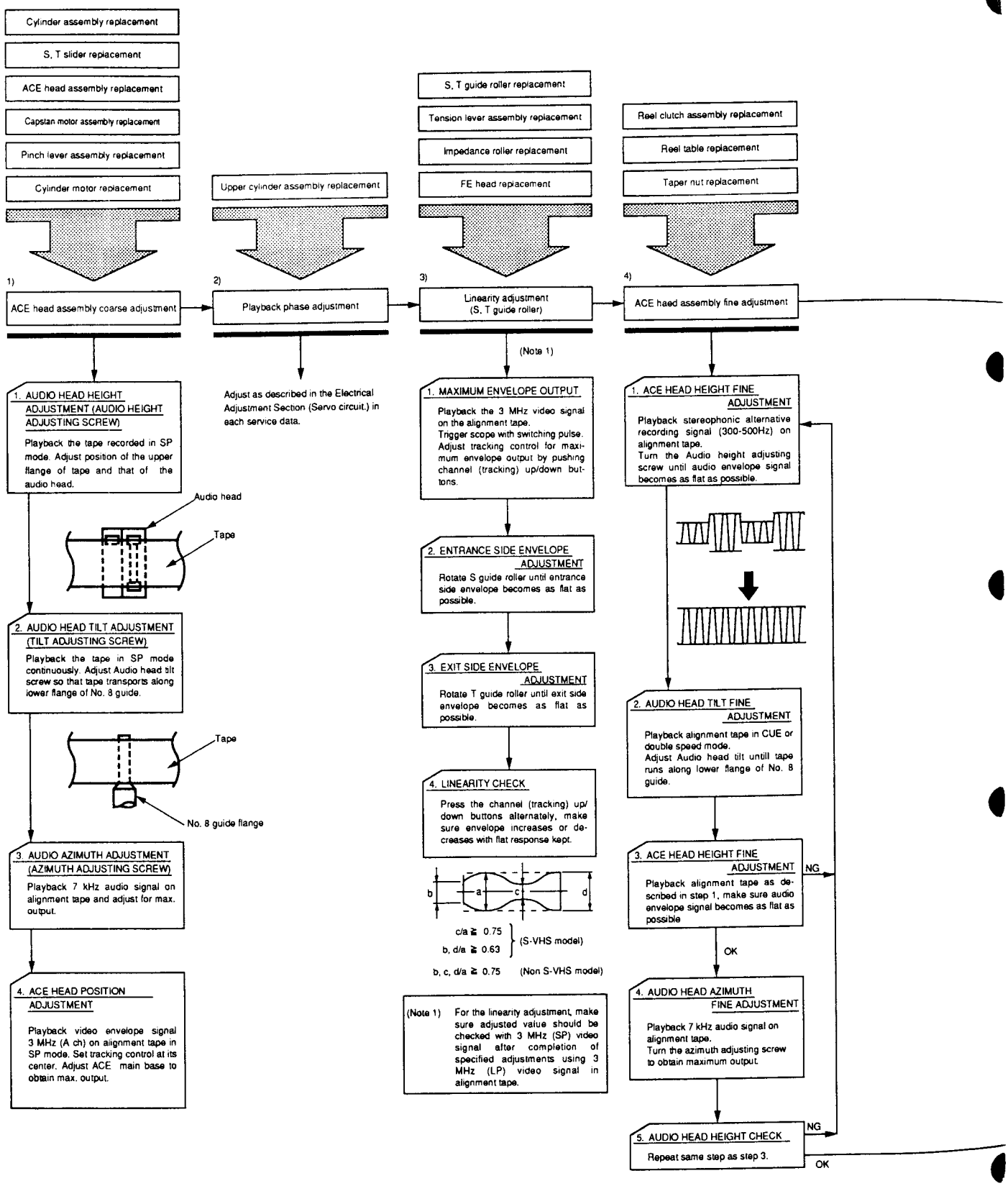


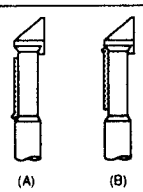
Fig. 7-3-2 Location of tape transport adjustment

(2) Tape transport system adjustment flow chart


Cylinder assembly replacement
S, T slider replacement
ACE head assembly replacement
Capstan motor assembly replacement
Pinch lever assembly replacement
Cylinder motor replacement
Upper cylinder assembly replacement
S, T guide roller replacement
Tension lever assembly replacement
Impedance roller replacement
FE head replacement
Reel clutch assembly replacement
Reel table replacement
Taper nut replacement
1)
ACE head assembly coarse adjustment
2)
Playback phase adjustment
3)
Linearity adjustment (S, T guide roller)
4)
ACE haed assembly fine adjustment
1. AUDIO HEAD HEIGHT ADJUSTMENT (AUDIO HEIGHT ADJUSTING SCREW)
Playback the tape recorded in SP mode. Adjust position of the upper flange of tape and that of the audio head.
Audio head
Tape
2. AUDIO HEAD TILT ADJUSTMENT (TILT ADJUSTING SCREW)
Playback the tape in SP mode continuously. Adjust Audio head tilt screw so that tape transports along lower flange of No. 8 guide.
Tape
No. 8 guide flange
3. AUDIO AZIMUTH ADJUSTMENT (AZIMUTH ADJUSTING SCREW)
Playback 7 kHz audio signal on alignment tape and adjust for max. output.
4. ACE HEAD POSITION ADJUSTMENT
Playback video envelope signal 3 MHz (A ch) on alignment tape in SP mode. Set tracking control at its center. Adjust ACE main base to obtain max. output.
Adjust as described in the Electrical Adjustment Section (Servo circuit.) in each service data.
(Note 1)
1. MAXIMUM ENVELOPE OUTPUT
Playback the 3 MHz video signal on the alignment tape.
Trigger scope with switching pulse.
Adjust tracking control for maximum envelope output by pushing channel (tracking) up/down buttons.
2. ENTRANCE SIDE ENVELOPE ADJUSTMENT
Rotate S guide roller until entrance side envelope becomes as flat as possible.
3. EXIT SIDE ENVELOPE ADJUSTMENT
Rotate T guide roller until exit side envelope becomes as flat as possible.
4. LINEARITY CHECK
Press the channel (tracking) up/down buttons alternately, make sure envelope increases or decreases with flat response kept.
b
a
c
d
c/a ≧ 0.75
b, d/a ≧ 0.63
(S-VHS model)
b, c, d/a ≧ 0.75 (Non S-VHS model)
(Note 1) For the linearity adjustment, make sure adjusted value should be checked with 3 MHz (SP) video signal after completion of specified adjustments using 3 MHz (LP) video signal in alignment tape.
1. ACE HEAD HEIGHT FINE ADJUSTMENT
Playback stereophonic alternative recording signal (300-500Hz) on alignment tape.
Turn the Audio height adjusting screw until audio envelope signal becomes as flat as possible.
2. AUDIO HEAD TILT FINE ADJUSTMENT
Playback alignment tape in CUE or double speed mode.
Adjust Audio head tilt untill tape runs along lower flange of No. 8 guide.
3. ACE HEAD HEIGHT FINE ADJUSTMENT
NG
Playback alignment tape as described in step 1, make sure audio envelope signal becomes as flat as possible
OK
4. AUDIO HEAD AZIMUTH FINE ADJUSTMENT
Playback 7 kHz audio signal on alignment tape.
Turn the azimuth adjusting screw to obtain maximum output.
5. AUDIO HEAD HEIGHT CHECK
NG
Repeat same step as step 3.
OK

5) No. 9 guide lever check

1. TAPE WRINKLE CHECK
- Playback E-240 tape in Review mode.
- Confirm the portion of upper/lower flange on No.8 guide.



2. NO. 9 GUIDE

If tape travels out of upper/lower flange as shown above, pinch lever or capstan motor or No.9 guide lever is defective.
Replace the defective part(s).

6) Check for transitional operation

1. Playback 3 MHz video signal (LP mode) in alignment tape and set review mode.

2. Change mode from review to play and check entrance side envelope rises within 3s.
Check entrance side envelope rised within 3s, when mode is changed from slot-in to play.

OK

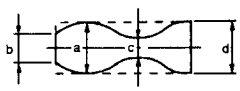
NG

3. Adjust S guide roller to readjust linearity.

4. Check step 2 and 3 if no good, replace S slider assy or tension lever.

7) Recorded & reproduced envelope check

- Records signals in SP & LP modes, using E-180, E-240 tape and playback them to check envelopes.



c/a ≧ 0.75
b, d/a ≧ 0.63 } (Non S-VHS model)

b, c, d/a ≧ 0.75 (S-VHS model)

8) Tape damage check

- Run E-240 tape in each mode and check there is no damage at each guide.

Playback mode
- Guide roller section damage
  - Back to step 3) linearity adjustment. (or Slider assembly replacement)
- Damage at No.8 guide brush
  - Back to step 1) ACE head assembly coarse adjustment. (or Pinch lever replacement)
- Damage at No.1 guide lower flange
  - Back to step 6) cheek for transitional operation. (or Tension lever replacement)

Review
- Damage at No.8 guide flange
  - Back to step 5) No.9 guide lever check or 1) ACE head assembly coarse adjustment. (Pinch lever, No.9 lever, Capstan motor replacement)
- Damage at guide roller section
  - Back to step 3) linearity adjustment. (or Slider assembly replacement)

Frame advance mode
- Damage at No.8 guide flange
  - Back to step 3) linearity adjustment.

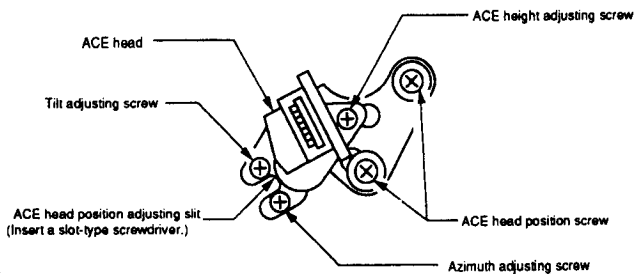
9) Checks for Hi-Fi models only.

AFM envelope output max. point check

Playback 3 MHz video signal. 400 Hz AFM signal in alignment tape ST-C7 in SP mode.

Check video envelope max. point (A ch).

Check control pulse phase difference is within ±3 ms from that point to AFM envelope max. point.



6. ACE HEAD POSITION
- Set tracking at its center position pushing channel (tracking) up/down buttons simultaneously.
- Playback 3 MHz video signal (LP mode) on the alignment tape. Slide ACE main base to obtain max. envelope.
- Playback 3 MHz (A ch) video signal (LP mode) on the alignment tape. Confirm that difference from tracking center is within 3 ms when maximum envelope is obtained.
- If not, readjust in LP mode.

* VTR applied SP mode only. Use 3 MHz (A ch) video signal (SP mode) instead of 3 MHz video signal (LP mode).

(3) Tape transport system adjustment

<Pre-adjustment>

When the part(s) listed in Table 7-3-1 is replaced, perform required adjustments by referring to procedures for the tape transport system. When the part(s) listed in Table 7-3-1 is replaced, the tape path may be changed and may damage alignment tape. To prevent this, first run a E-240 tape and make sure excessive tape wrinkle does not occur at each tape guide.

1. If tape wrinkle is observed at the S, T guide rollers, turn the S, T guide rollers until wrinkle disappears.
2. If tape wrinkle is observed at the No. 8 guide, perform the tilt adjustment of the ACE head.

Table 7-3-1

Parts replacement	Adjustment procedure
• Cylinder assembly • S, T sliders • ACE head • Pinch lever assembly • Capstan motor • No. 9 guide lever assembly	From item 1)
• Upper cylinder	From item 2)
• S, T guide rollers • Tension lever assembly • FE head	From item 3)
• Reel clutch assembly • S, T reel tables	From item 4)

<Adjustment procedures>

1) ACE head assembly coarse adjustment

a. Audio head height adjustment

1. Play back the tape recorded in the SP mode. Observe the surface of the ACE head.
2. Turn the ACE height adjusting screw so that upper tape edge matches to the upper edge of the audio head core.

b. ACE head tilt adjustment

1. Play back the tape recorded in the SP mode and observe running condition of the tape at the lower flange of No.8 guide.
2. Turn the ACE tilt adjusting screw until tape wrinkle is caused at the lower flange of No. 8 guide as shown in Fig. 7-3-4 (A).
3. Turn the ACE tilt adjusting screw counterclockwise until the tape travels along the lower flange as shown in Fig. 7-3-4 (B).

c. Audio head azimuth adjustment

1. Play back the 7 kHz audio signal on the alignment tape in the SP mode.
2. Connect a millivoltmeter or oscilloscope to the audio line output terminal.
3. Turn the ACE azimuth adjusting screw to obtain maximum audio output.

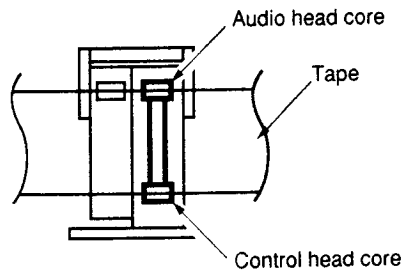


Fig. 7-3-3

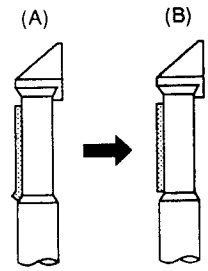


Fig. 7-3-4 No. 8 guide rough adjustment

d. ACE head position adjustment

1. Play back the 3 MHz video envelope signal in the alignment tape in the SP mode. Loosen the ACE head position securing screw.
2. Insert a slot-type screwdriver into the ACE head position adjusting slit on the ACE main base and adjust the ACE main base so that the video envelope reaches a peak level at the tracking center position when the channel (tracking) up/down buttons of VTR are pressed simultaneously.

2) Playback phase adjustment

1. Perform the adjustment according to the methods stated in the electrical adjustment (servo circuit).

3) Linearity adjustment

1. Play back the LP mode 3 MHz video signal on the alignment tape

Note:

- For models SP mode only, use the 3 MHz (A ch) video siganl in the SP mode.

2. Trigger the scope with the switching pulse to issue the envelope signal output.
3. Make sure the video envelope waveform (in its maximum output) meets the specification shown in Fig. 7-3-5. Again make sure the same by playing back the SP mode 3 MHz video signal on the alignment tape. If not satisfied, adjust as follows:

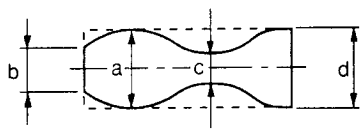
Note:

a = maximum output of the video RF envelope

b = minimum output of the video RF envelope at the entrance side

c = minimum output of the video RF envelope at the center point of cylinder

d = minimum output of the video RF envelop at the exit side of cylinder



c, b, d/a ≧ 0.75 (S-VHS model)

b, d/a ≧ 0.63
c/a ≧ 0.75
} (Non S-VHS model)

Fig. 7-3-5

4. If the (A) section in Fig. 7-3-6 does not meet the specifications, adjust the S guide roller in up or down direction.
5. If the (B) section in Fig. 7-3-6 does not meet the specifications, adjust T guide roller in up or down direction.

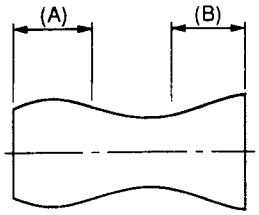


Fig. 7-3-6

6. After completion of the adjustment(s), push the channel (tracking) up/down button and make sure video envelope variations are almost flat.
   Next, play back the 3 MHz SP mode video signal on the alignment tape and makes the video RF envelope variations are also flat when channel (tracking) UP/DOWN buttons is pushed.
7. If the envelope varies like NG figures as shown in Fig. 7-3-7, perform the adjustment again.

   Smooth secondary curves are allowable level.

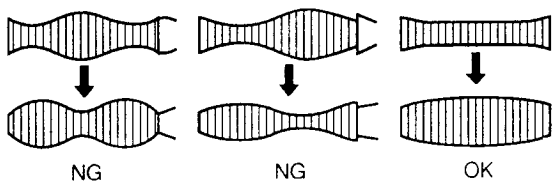


Fig. 7-3-7 Abnormal waveform variation

4) ACE head assembly fine adjustment

a. ACE head height fine adjustment

1. Play back the stereophonic alternative recording 300 – 500 Hz audio signal on the alignment tape.
2. Adjust the ACE height adjusting screw so that the signal envelope is obtained almost flat.

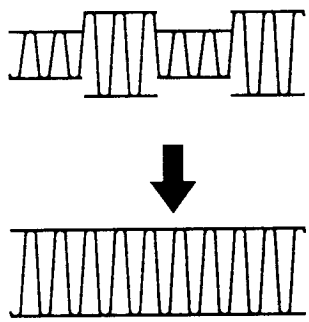


Fig. 7-3-8

Note:

- If there is no alignment tape (ST-C6, ST-C7), do not perform this item "a. ACE head height fine adjustment", and perform the process of the note in item "e. Audio head height check" described later.

b. ACE tilt adjustment

1. Observe the lower flange of No. 8 guide. If any wrinkle is observed, turn the ACE tilt adjusting screw counterclockwise until the wrinkle disappears.
2. If a gap is observed between the lower flange of No. 8 guide and the lower edge of tape, turn the ACE tilt adjusting screw clockwise until the tape travels along the lower flange.

Note:

- This adjustment is performed easily in SP mode playback, double speed playback mode or CUE mode.

c. Audio head height check

1. Play back the stereophonic alternative recorded 300 – 500 Hz audio signal as described in the step 4)-a, and check if the audio envelope is flat. If not, repeat the adjustment described in step 4)-a again.

d. Audio azimuth adjustment

1. Play back the 400 Hz, 7 kHz audio signal on the alignment tape.
2. Turn the ACE azimuth adjusting screw until the maximum audio output is obtained.

e. Audio head hight check

1. Play back the alignment tape desribed in step 4)-a and check if the audio envelope is flat. If not, repeat the adjustment described in step 4)-a.

Note:

- If there is no alignment tape (ST-C6, ST-C7), perform the audio height alignment using the current alignment tape at this adjustment step.

1. Playback the 400 Hz audio signal (SP mode) on the alignment tape.
2. Turn each three alignment screw of the ACE head to the same direction in 45 degrees steps evenly so that the audio output level becomes maximum.
3. Perform the confirmation and adjustment for the tilt and the azimuth again.

f. ACE head postion adjustment

1. Play back the 3 MHz video signal (LP mode) on the alignment tape.
2. Push the channel (tracking) up/down buttons simultaneously and reset the tracking at its center position.
3. Trigger the oscilloscope with the video switching pulse and observe the video envelope waveform.
4. Slide the ACE main base until the maximum envelope output is obtained as described in ACE head position coarse adjustment.
5. Play back the 3 MHz video signal (SP mode) on the alignment tape.
6. Make sure the envelope output is maximum when the tracking control is placed at its center position.

   If no envelope output is obtained with the tracking control set to the center position, again adjust it for maximum envelope output in SP and LP modes. When envelope output is maximum in the LP mode at the tracking center, difference with the case in the SP mode is within 3 ms.
7. Tighten the ACE head position fixing screw and secure the ACE main base.

g. After completion of ACE head fine adjustment, apply screw lock to two screws (tilt, azimuth adjusting screws) in front of the ACE head.

5) No. 9 guide lever adjustment

1. Set the VTR to Cue mode with E-240 tape (at beginning portion) loaded. Switch the Cue mode to the review mode when the tape has been rewound into the T-reel table to some extent.
2. Check tape wrinkle at the upper and lower flange of No. 8 guide. Check the tape does not come off from the flange while running. If the tape comes off from the flange, replace the pinch lever, capstan motor or No. 9 guide lever since the part(s) is (are) defective.

Note:

- Modify the lid of the cassette for the alignment tape E-240 previsously so that the alignment is performed easily.

6) Check for transitional operation from Review to Play, slot-in to play

1. Play back the LP mode white video signal on the alignment tape in Review mode and observe the video envelope with the oscilloscope.
2. Switch the Review mode to the Play mode. When switched to the Play mode, make sure the entrance side envelope comes to an approximate steady state within 3s as shown in Fig. 7-3-9.

If it does not rise within 3s, take the following steps starting 4).

3. Switch the cassette slot-in mode to the Play mode. As in item 2), if it does not rise within 3s, adjust as follows.

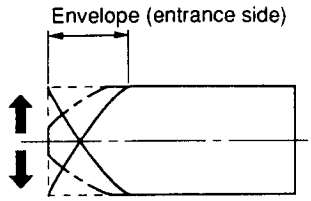


Fig. 7-3-9 Video envelope rising when operation mode is switched from review to play mode

4. Adjust the S guide roller and perform the linearity adjustment again.
5. Check above items 2) and 3) to see that the video envelope rises within 3s. If not, S slider assembly or the tension lever is damaged. Replace either (or both) of them.

Note:

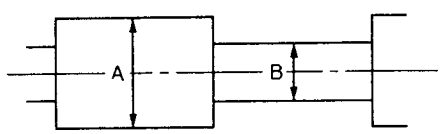
- If the rising characteristic is poor in Review mode, screen noise may occur in synchronous editing recording. Perform the adjustment carefully.

7) Envelope check

1. Make recordings and play back the tapes (E-180 and E-240) in SP and LP modes and make sure the playback output envelope meets the specifications shown in Fig. 7-3-5.
2. In playback the tape (with a E-180), the video envelope should meet the specification as shown in Fig. 7-3-10.

Note:

- Check for both modes, SP and LP. Also check for AFM envelope when using a Hi-Fi model.



- B/A ≧ 0.55
- B ≧ 120mV

Fig. 7-3-10 Envelope output and output difference

3. If the performance does not meet both specifications above 1 and 2 above, replace the upper cylinder assembly.
4. Set the VTR to Rec mode (LP) with the E-180 tape loaded (at the beginning part) and check operation of the synchronous editing recording.
5. If picture noises are observed at the starting position of the editing, perform "6) Check for transitional operation from Review to Play, slot-in to play".

8) Tape wrinkle check

1. Playback the E-240 tape in the normal Play mode, CUE mode, Review mode and the frame advance mode, and check each guide for wrinkle.
2. If excessive tape wrinkle is observed at the mode shown below, perform the associated adjustments also shown below. (The parts described in ( ) may need to replace.)

a. Playback mode

Tape wrinkle at the S, T-guide rollers section

Item 3) Linearity adjustment
(Slider assembly)

Tape wrinkle at No. 8 guide flange

Item 1) ACE head assembly coarse adjustment
(Pinch roller)

Tape wrinkle at lower flange of No. 1 guide

Item 6) Check for transitional operations from Review to Play, and Slot-In to Play
(Tension lever)

b. Review mode

Tape wrinkle at No. 8 guide

Item 1) ACE head assembly coarse adjustment
(Pinch lever, No. 9 guide lever. capstan motor)

Tape wrinkle at the guide rollers

Guide roller adjustment (Slider assembly)

c. Frame advance mode

Tape wrinkle at No. 8 guide

Item 3) Linearity adjustment
(Pinch lever, capstan motor)

9) **Maximum AFM envelope output point check (Hi-Fi model)**

1. Playback the SP mode 3 MHz video signal and the 400 Hz AFM signal on the alignment tape.
2. Trigger the oscilloscope with the video switching pulse, adjust the tracking control and check the control pulse phase at the maximum video envelope (A ch) output point.
3. Make sure the control pulse phase difference among each maximum point of AFM envelope, Ach and Bch is within ± 3 ms with the above point used as the basic reference.

Note:

- If the phase difference exceeds 3 ms, replace the upper cylinder.

2. ELECTRICAL ADJUSTMENT

<Test equipment required>

Adjustment will be performed with the following test equipment.

1. Color TV (Monitor)
2. Oscilloscope, 2 CHs, 15 MHz or higher with delay system
3. Frequency counter (7 digits or higher)
4. Millivoltmeter
5. Digital voltmenter
6. Tester (20 kΩ/V)
7. Audio generator
8. Audio attenuator
9. Alignment tapes
   Part code: ST-C6: 70909409, ST-C7: 70909410
10. Alignment screw driver (jig)
11. Color pattern generator
12. Video sweep generator

<Color bar signal>

Color bar signals of 75% recorded on the alignment tapes are shown in Fig. 2-1-1.

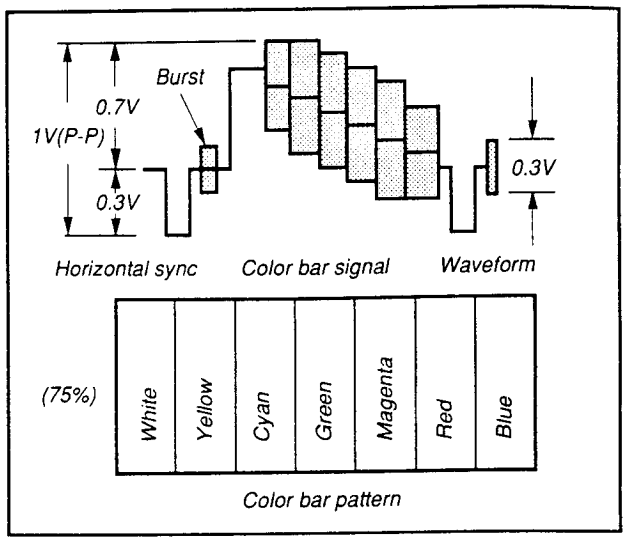


Fig. 2-1-1

<Specified input and output levels, and impedance>

Video input:	Negative sync, standard composite video siganl 1 V(p-p), 75Ω
Video output:	Same as the video input 1 V(p-p), 75Ω
Audio input:	308 mV(rms), more than 47 kΩ (phono type), more than 10 kΩ (21 pin type)
Audio output:	308 mV(rms), less than 1.0 kΩ (21 pin type)

<Alignment sequence>

Recorded the alignments in the sequence as shown in Fig. 2-1-2.

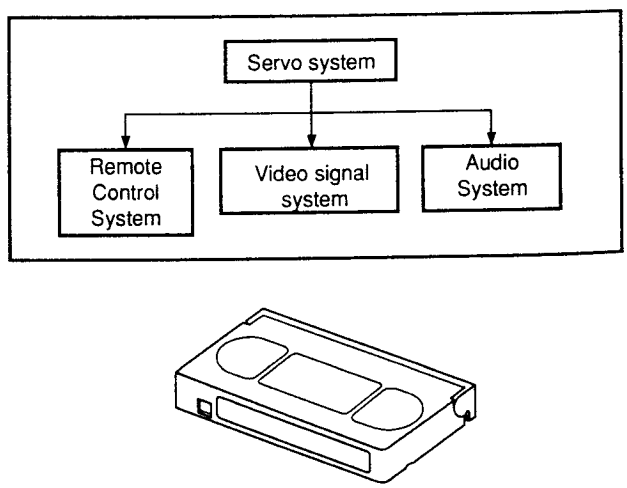


Fig. 2-1-2

Alignment tape specifications

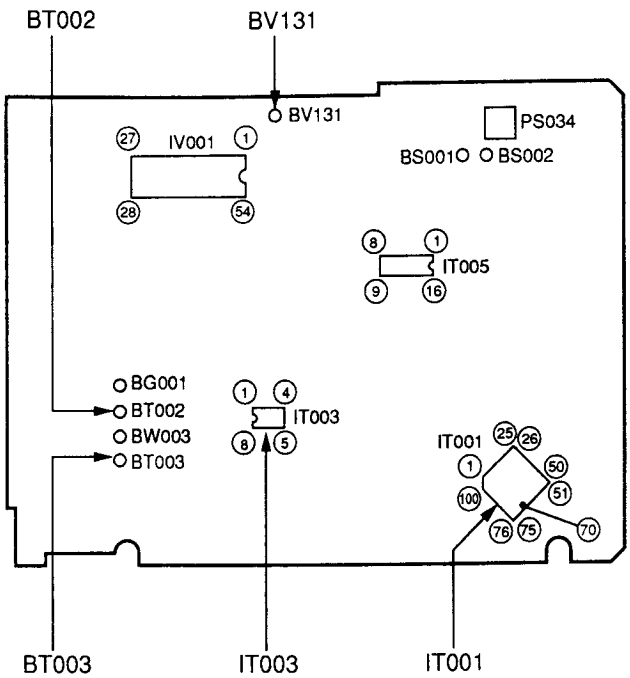
[1] ST-C6

Segment	System	Playback		Video Signal	Audio Signal	Applications
		Time (min)	Mode			
1	PAL & SECAM	10	SP	Mono Scope	1 kHz	Playback phase check, audio level check
2	PAL & SECAM	5	SP	3 MHz A ch	400 Hz and 7 kHz	ACE head position adjustment, ACE head azimuth adjustment, Linearity adjustment
3	PAL & SECAM	5	SP	3 MHz A ch	1 kHz (stereo)	ACE head position adjustment, ACE head height adjustment, Linearity adjustment
4	PAL	5	SP	Color bar	3 kHz	Video and Sound checks
5	SECAM	5	SP	Color bar	3 kHz	Video and Sound checks
6	MESECAM	5	SP	Color bar	3 kHz	Video and Sound checks
7	NTSC	5	SP	Color bar	1 kHz	Video and Sound checks

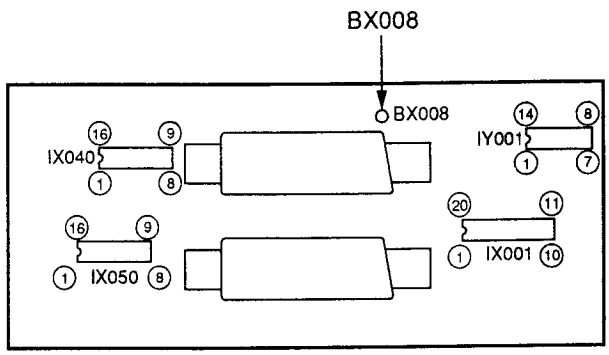
[2] ST-C7

Segment	System	Playback		Video Signal	Audio Signal	Applications
		Time (min)	Mode			
1	PAL	5	LP	3 MHz A ch	500 Hz (stereo)	ACE head position adjustment, ACE head height adjustment, Linearity adjustment
2	PAL	3	LP	Color bar	3.2 kHz	LP mode operation check, ACE head azimuth check and adjustment
3	PAL	3	SP	Color bar	AFM 400 Hz	SP mode operation check, AFM check
4	PAL & SECAM	5	SP	3 MHz A ch	AFM 400 Hz	AFM tracking checks
5	SECAM	5	LP	3 MHz A ch	No signal	Linearity adjustment
6	SECAM	3	LP	Color bar	No signal	LP mode operation check
7	SECAM	3	SP	Color bar	AFM 400 Hz	SP mode operation check, AFM check

2-1. Servo Circuit



Main PC Board



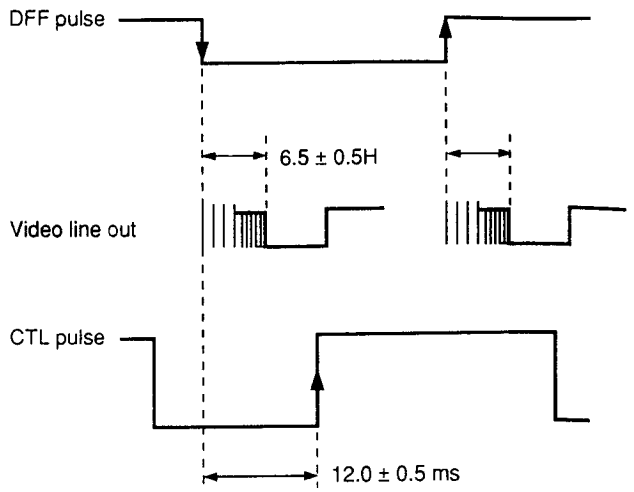
Terminal PC Board

2-1-1. Playback Phase (PG) Adjustment

Test point: BT002, BT003, BX008 (Video out)

Test equipment: Oscilloscope

1. Confirm that phase difference between the fall of the DFF pulse (BT002) and the rise of CTL pulse (BT003) is 12.0 ± 0.5 ms.
2. Further, observe the envelope (BV131) waveform, and confirm that the ACE head position adjustment and linearity adjustment have been made, and C-SYNC (pin 70 of IT001) is being input during playback.
3. Set the VTR to the STOP mode.

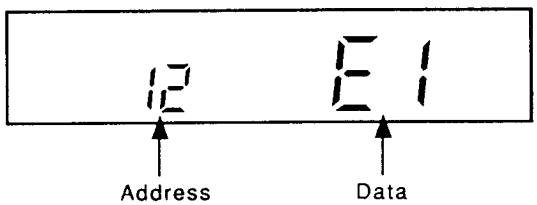


4. Press the unit's channel up/down buttons simultaneouly for more than 5s.
5. Afterwards, within 2s, press the PLAY button on the remote controller.
6. The automatic adjustment will be made for about 10s, all the displays will blink. If the automatic adjustment is not carried out, confirm that the alignment tape has a safety tab or not, and redo from the step 3.
   1) When adjustment has been completed:
      The display will blink for 10s, stop blinking and return to the normal display in the STILL mode, then it shifts to the playback display in the play-back mode.
   2) When adjustment fails:
      It goes into the STOP mode.
7. Confirm that the play indicator is displayed, and confirm that the rising and falling edge of the SW pulse is 6.5 ± 0.5H from the V-sync front edge of the video signal.

2-1-2. In Case of IT003 is Replaced

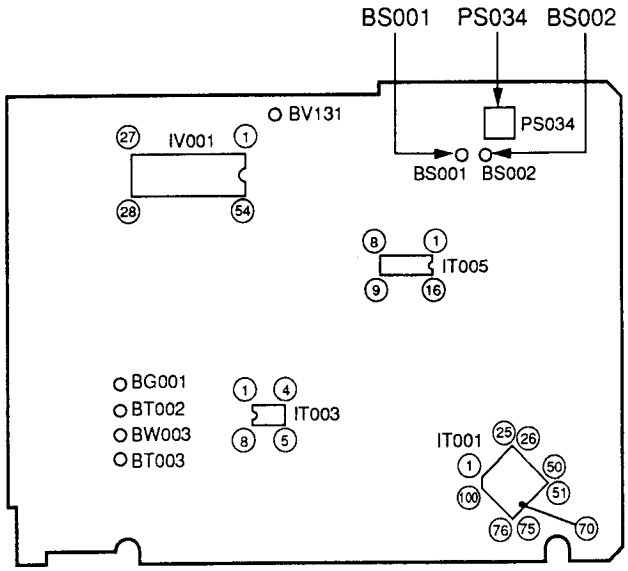
When IT003 is replaced, the data in the VTR is required to memorize in the new one. So perform the following procedures.

1. Press the channel up/down buttons on the VTR simultaneously for more than 5s while the display blinks and the unit is in the power off mode.
2. And then within 2s, press the CANCEL button on the remote controller.
3. After displaying the address at the channel display area and the data at the minute display area, set the address to 12 using the channel up/down buttons on the remote controller.
   Next, set the data to E1 using the FF/REW buttons on the remote controller. The data goes up using FF button and down using REW button.
4. Perform the adjustement described in the item "2-1-1. Playback Phase (PG) Adjustment".
5. Pull out the power cord plug from the AC outlet once and insert the power cord plug into the AC outlet again.



6. Perform the channel presetting as the IT003 replaced has no channel data.

2-2. Audio Circuit



Main PC Board

2-2-1. Bias Level Adjustment

Test Point: BS001, BS002

Test equipment: Millivoltmeter

Adjusting point: PS034

1. Set the VTR to record mode.
2. Connect BS001 to the millivoltmeter and BS002 to GND.
3. Adjust PS034 to obtain 3.6 ± 0.1 mV(rms).

2-3. Self Diagnosis Function

2-3-1. Outline

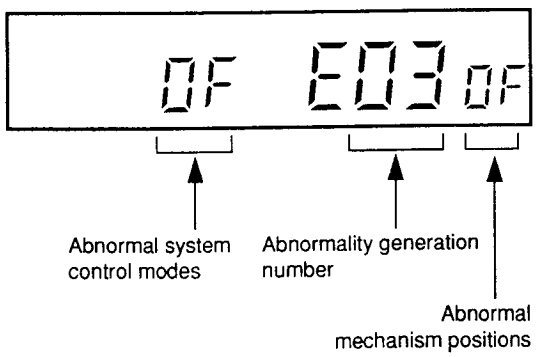
When a tape running stops or the VTR enters the power OFF mode, etc. due to some abnormality, the abnormality is stored in the EEPROM and displayed on the display tube.

2-3-2. Storing abnormal modes

- The abnormality is classed into 5 groups, and the abnormality number, system control mode, and the mechanism position at which the abnormality occurred are stored in the EEPROM.
- The writing timing is just after the abnormality occurred.

2-3-3. Abnormality mode display

- Press the CH UP and CH DOWN buttons on the VTR simultaneously for more than 5s.
- And then within 2s, press the STILL button on the remote control.
- The system control mode at which the abnormality occurred is displayed at the channel display area, "E" is displayed at the hour digit, abnormality generation number is displayed at the minute digit, and the mechanism position is displayed in the second digit position.
- The abnormality mode is displayed regardless of the power on off.



- When the Counter Reset button is pressed in the display period, the abnormality display data is initialized and "-" is displayed.

The data displayed are as follows:

Abnormality generation number

01	Cylinder stop
02	Reel abnormality (take up)
03	Reel abnormality (supply)
04	Abnormal slot in/ slot out
05	Abnormal loading

Abnormal system control modes

00	Standby
01	Stop
02	Rewind
03	Review
04	FF
05	Cue
06	Playback
07	Still, slow playback
08	2X speed
09	Unloading Stop
0A	Reverse playback
0b	Still in reverse playback, Reverse slow playback
0C	Recording
0d	Record pause
0E	Power off eject
0F	Eject
10	Short FF
11	Short REW
13	Audio dubbing
14	Audio dubbing pause

Abnormal mechanism positions

01	F/L out
03	F/L down
05	Loading/unloading
07	Reverse rotation with pinch roller ON
09	Playback with pinch roller ON
0b	Stop with main brake ON
0d	FF/REW
0F	Position detection impossible

Positions 0, 2, 4 exist as mechanism positions. For example, 8 shows a position between 7 and 9 (between playback position and review position).

SECTION 3
SERVICING DIAGRAMS

1. INSPECTION PROCEDURE

Operation steps		Items to be confirmed	Inspection block	Page	
				Block Diagram	Circuit Diagram
1. AC Plug-in	Clock setting Program timer setting	Clock display Clock setting operation	Power (AC system) KDB	3-11 3-13	3-29 3-35
2. Power SW ON	Timer/counter, Memory Channel selection, EE picture & tone quality	Mode display lamp TV receive condition, Channel select operation, EE picture quality, Tone signal level	Power Logic RF reception Audio (EE, REC mode)	3-11 3-17 3-12 3-27	3-29 3-38 3-32 3-49
3. Cassette-in and Cassette-out	Cassette-in Cassette loading Eject Cassette-out	F/L mechanism operation Cassette loading operation Eject operation Indicator lamp Abnormal sound	Logic	3-17	3-38
4. Key Entry Operation Remote Control	REC, PLAY Cue/Review Still, Frame advance/slow FF/REW	Indicator lamp Each mode operation (Tape drive operation) Abnormal sound	Logic	3-17	3-38
5. Special Functions Counter Functions Tracking	Linear time counter, Remaining time display, Index/skip search, Time search Digital auto tracking	Each mode operation Mode operation	Servo/Logic Servo/Logic	3-17 3-17	3-38 3-38
6. Playback Function Picture Sharpness Tone Quality Othres	PLAY (Test tape: ST-C6, ST-C7) Cue/Review Still/Slow	Resolution, S/N Hue, Saturation, Color unevenness, Color dropout, Sound distortion, Level variation, Picture noise, Jitter Picture swing, Skew distortion, Flicker, Beat	Video PLAY system Audio PLAY system Servo system	3-24 3-27 3-17	3-42 3-49 3-38
7. REC/PLAY Functions Picture Sharpness Tone Quality Others	REC/PLAY	Resolution, S/N Hue, Saturation, Color unevenness, Color dropout, Sound distortion, Level variation, Picture noise, Jitter Picture swing, Skew distortion, Flicker, Beat	Video PLAY system Audio PLAY system Servo system	3-24 3-27 3-17	3-42 3-49 3-38

How to use the table
1. When inspecting a defective VTR, proceed according to the steps shown in the table.
2. Check the items to be confirmed for each operation step.
3. If a problem is found on the item, check waveforms (level) referring to the block diagram relating to the items.
4. Use PC board pattern diagram and schematic diagram to examine the circuit precisely.

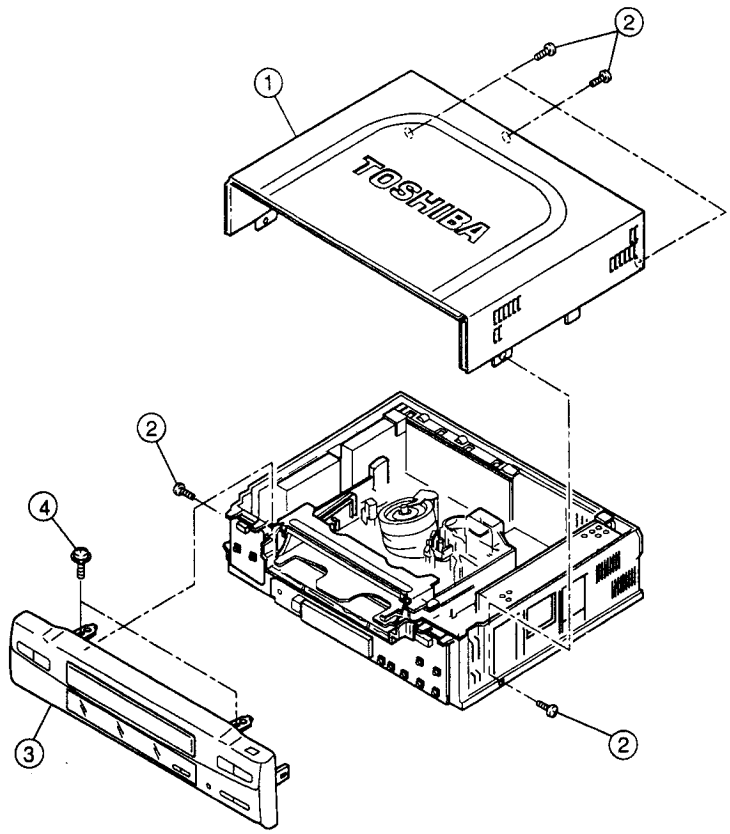
2. REMOVAL OF CABINET

1. Disconnect power cord plug from AC outlet.
2. Remove 5 screws ② securing top cover ①.
3. Remove the top cover ① by sliding it backward.
4. Remove 2 screws ④.

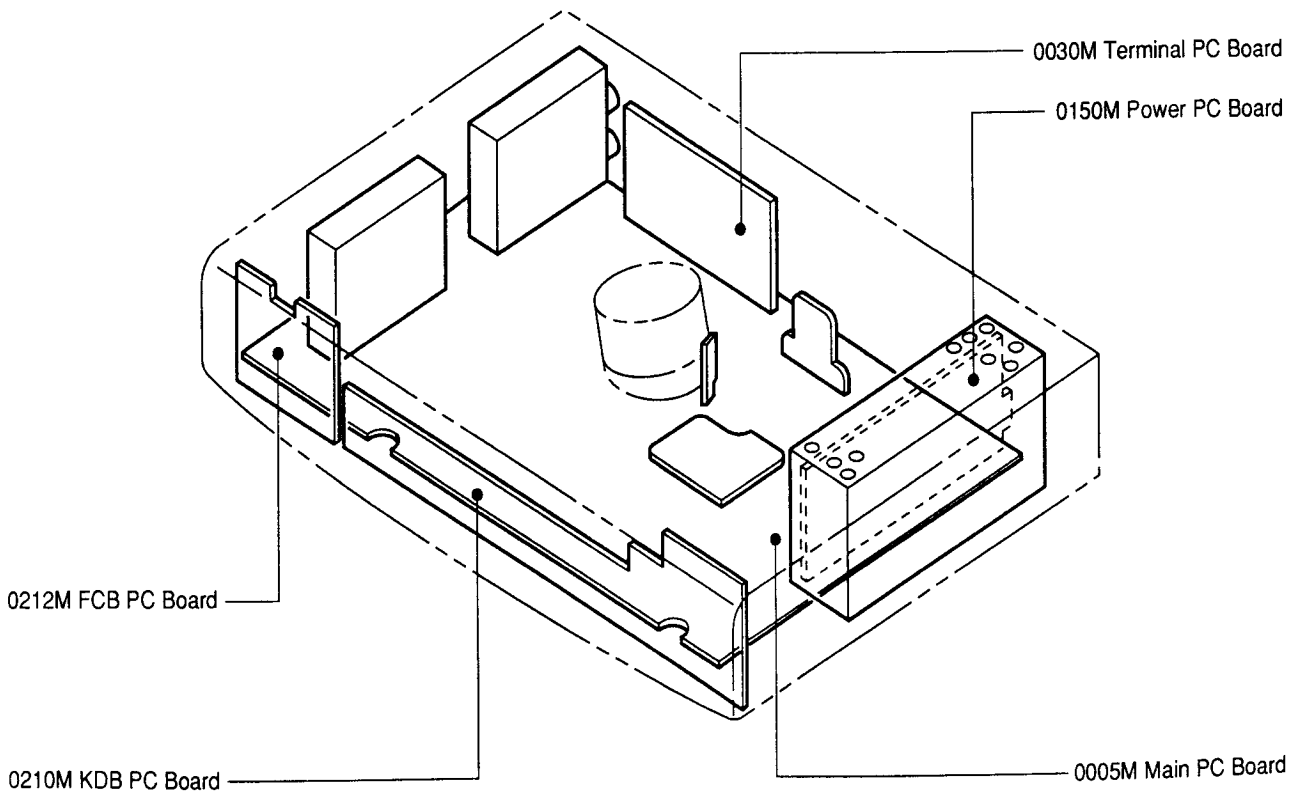
Note:

These screws are not always applied to all VTRs.

5. Remove the front panel ③.



3. ELECTRICAL UNITS LOCATION DIAGRAM

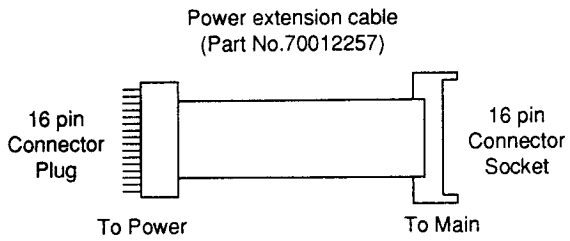


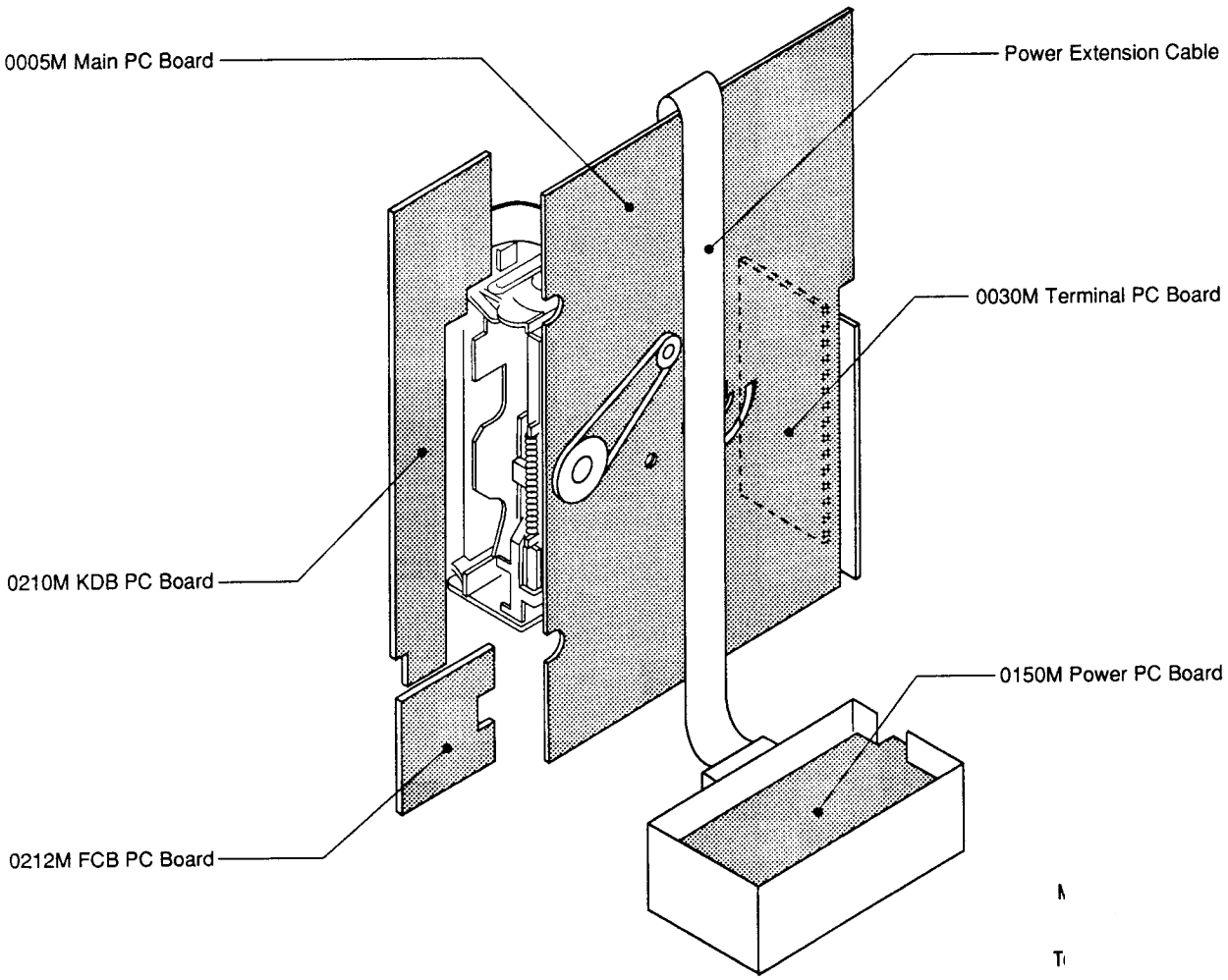
4. STANDING PC BOARDS FOR SERVICING

After removing the mechanical deck with the main PC board, place the mechanical deck to upright. Then perform servicing in the condition that all the units are connected each other.

Note:

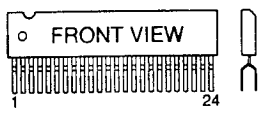
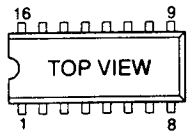
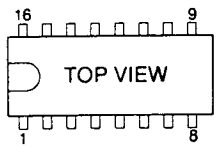
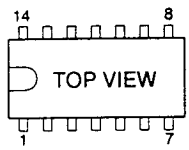
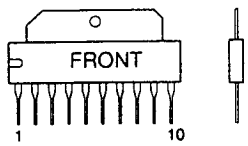
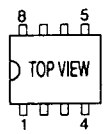
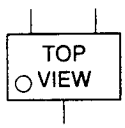
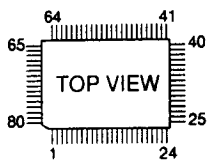
- Connect the Power PC board to the Main PC board using the power extension cable (Part No. 70012257).

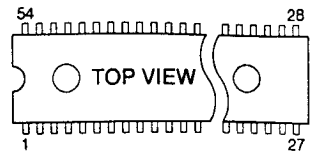
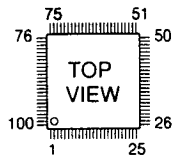




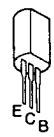
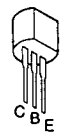
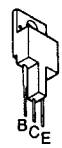
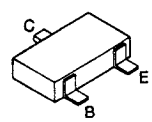
5. PART CONFIGURATION AND THEIR SYMBOLS

1.ICs

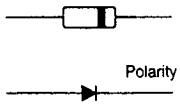
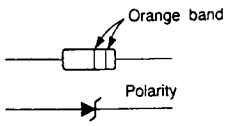
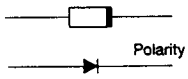
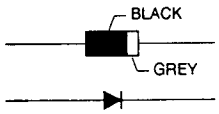
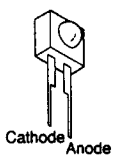
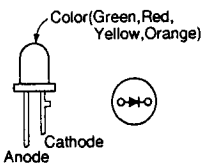
NAME	SHAPE
STV6400	
BA7795LS	
TB6515AP TL8850AP MC14053BCP	
MC14052/BCP	
SDA5649 U4614B	
TA7291S	
LM393N ST24C04	
PST7032MT	
TMP87CM70AF-6413	

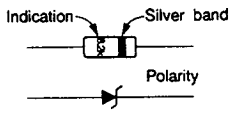
NAME	SHAPE
TA8892BN	
TMP90CS74DF-7824	

2.TRANSISTORs

NAME	SHAPE
PT493F	
2SC2236-Y(C) 2SA1020-Y	
BC337 BC548B	
BUL310XI	
RN1402,DTC144E,BC848B 2SA1162-Y,RN1401 2SC2712-Y,BC858 RN2403,BC848 RN1405,BC857B RN1404,BC847B	

3.DIODEs

NAME	SHAPE
1N4007 1N4148 1N4148	
ZPD5.6	
MUR115	
BAV20 1N4001	
FUF5404 BA157 BA157 1N5822	
LL4448 LL4148	
ZMM5.1 ZMM5.6/2 ZMM5.6	
GL451V	
SE303AC	

NAME	SHAPE
ZPD12	

5-1. Replacing Subminiature "CHIP" Parts

5-1-1. Required Tools:

1. Fine tipped, well insulated soldering "pencil", about 30 Watts.
2. Tweezers.
3. Blower type hair dryer.

5-1-2. Soldering Cautions:

1. Do not apply heat for more than 3s.
2. Avoid using a rubbing stroke when soldering.
3. Discard removed chips; do no reuse them.
4. Supplementary cementing is not required.
5. Use care not to scratch or otherwise damage the chips.

5-1-3. Removal (Resistors, Capacitors, etc.):

1. Melt the solder at one side.

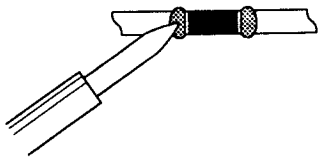


Fig. 1

2. Grasp the part with tweezers and melt the solder at the other side.

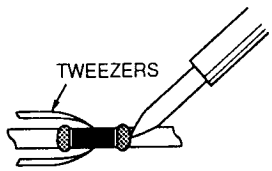


Fig. 2

3. Remove the part with a twisting motion.

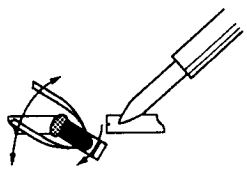


Fig. 3

5-1-4. Removal (Transistors, Diodes, etc.):

1. Melt the solder of one lead.

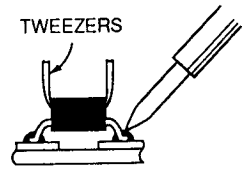


Fig. 4

2. Lift the side of that lead upward.

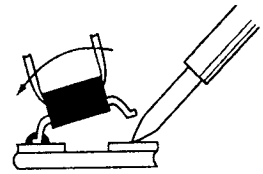


Fig. 5

3. Simultaneously heat solder the two remaining leads and lift part to remove.

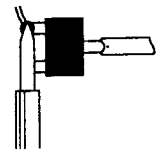


Fig. 6

5-1-5. Preheating (Except for semiconductors):

Immediately before installing new resistors or capacitors, use a blower type hair dryer and preheat the part for about two min. at approximately 150°C.

5-1-6. Replacement:

1. Presolder the contact points of the circuit pattern.

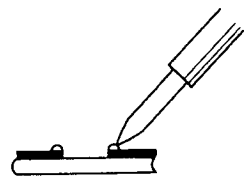


Fig. 7

2. Press the part downward with tweezers and apply the soldering pencil as indicated in the figure.

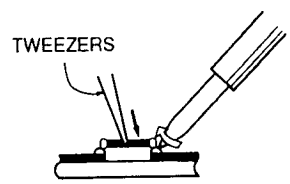


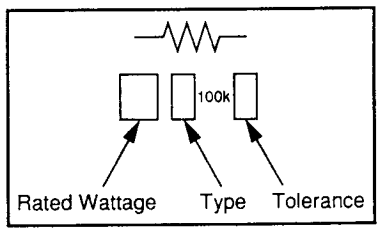
Fig. 8

5-2. Precautions for Part Replacement

- In the schematic diagram, parts marked ⚠ (ex. ⚠ F801) are critical part to meet the safety regulations, so always use the parts bearing specified part codes (SN) when replacing them.
- Using the parts other than those specified shall violate the regulations, and may cause troubles such as operation failures, fire etc.

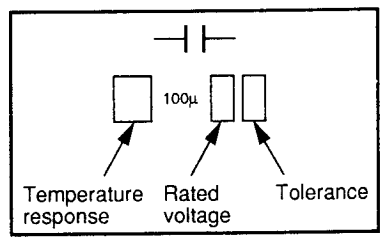
5-3. Solid Resistor Indication

Unit	None ..... Ω k ..... kΩ M ..... MΩ
Tolerance	None ..... ±5% B ..... ±0.1% C ..... ±0.25% D ..... ±0.5% F ..... ±1% G ..... ±2% K ..... ±10% M ..... ±20%
Rated Wattage	(1) Chip Parts None ..... 1/16W (2) Other Parts None ..... 1/6W Other than above, described in the Circuit Diagram.
Type	None ..... Carbon film S ..... Solid R ..... Oxide metal film W ..... Metal film W ..... Cement FR ..... Fusible



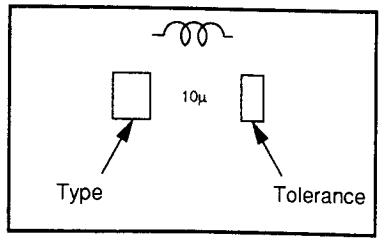
5-4. Capacitance Indication

Symbol	..... Electrolytic, Special electrolytic ..... Non polarity electrolytic ..... Ceramic, plastic ..... Film ..... Trimmer
Unit	None ..... F μ ..... μF p ..... pF
Rated voltage	None ..... 50V For other than 50V and electrolytic capacitors, described in the Circuit Diagram.
Tolerance	(1) Ceramic, plastic, and film capacitors of which capacitance are more than 10 pF. None ..... ±5% or more B ..... ±0.1% C ..... ±0.25% D ..... ±0.5% F ..... ±1% G ..... ±2% (2) Ceramic, plastic, and film capacitors of which capacitance are 10 pF or less. None ..... more than ±5% pF B ..... ±0.1 pF C ..... ±0.25 pF (3) Electrolytic, Trimmer Tolerance is not described.
Temperature characteristic (Ceramic capacitor)	None ..... SL For others, temperature characteristics are described. (For capacitors of 0.01 μF and no indications are described as F.)



5-5. Inductor Indication

Unit	None ..... H μ ..... μH m ..... mH
Tolerance	None ..... ±5% B ..... ±0.1% C ..... ±0.25% D ..... ±0.5% F ..... ±1% G ..... ±2% K ..... ±10% M ..... ±20%
Type	PL ..... Peaking For other, model name is described.



5-6. Waveform and Voltage Measurement

- Measurement of waveform and voltage at each section in the color circuits was conducted with sufficient service color bar signal being received and reproduced in normal conditions.
- Waveforms and voltage values for the remaining circuit were measured with a broadcasting signal normally received, so they may vary slightly according to the programs being received. Use them as a measure for servicing.
- All voltage values except the waveforms are expressed in DC and measured by a digital voltmeter.

5-7. Chip Part Replacement

(Use spare part with wire leads connected.)

1. Hold a Chip part to be removed with tweezers and apply heat to the solder at one end of the part with a soldering iron. (Fig. 9)

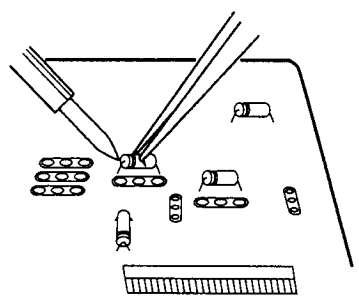


Fig. 9

2. Apply heat to the solder at the other end of the part and remove it.

   The heating time should be as short as possible so the excessive heat is not applied to foil patterns and the PC Board.

3. If it is difficult to remove the part, temporarily stop the desoldering job and wait until temperature of the part lowers.

   Then, repeat steps 1 and 2.

4. Form leads of the replacement part (general part equivalent to the chip part) as shown in the figures and solder place. (Fig. 10)

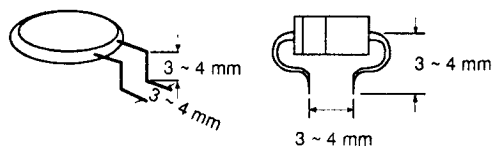


Fig. 10

5. Mount the replacement part so that it does not touch any other parts. (Fig. 11)

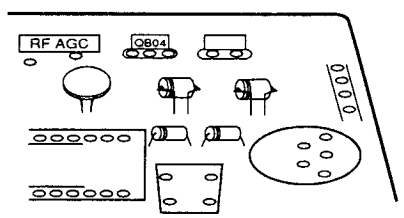
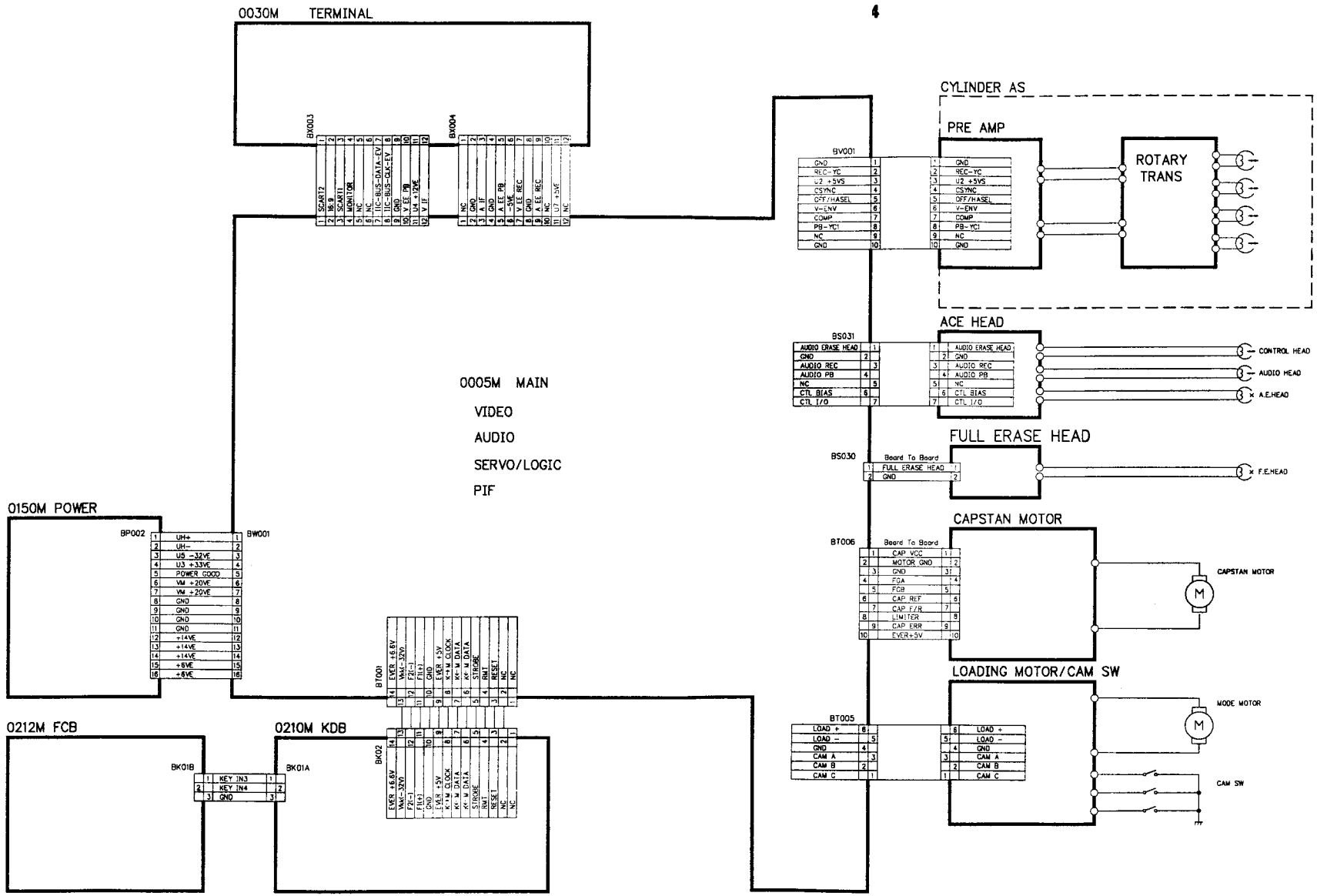


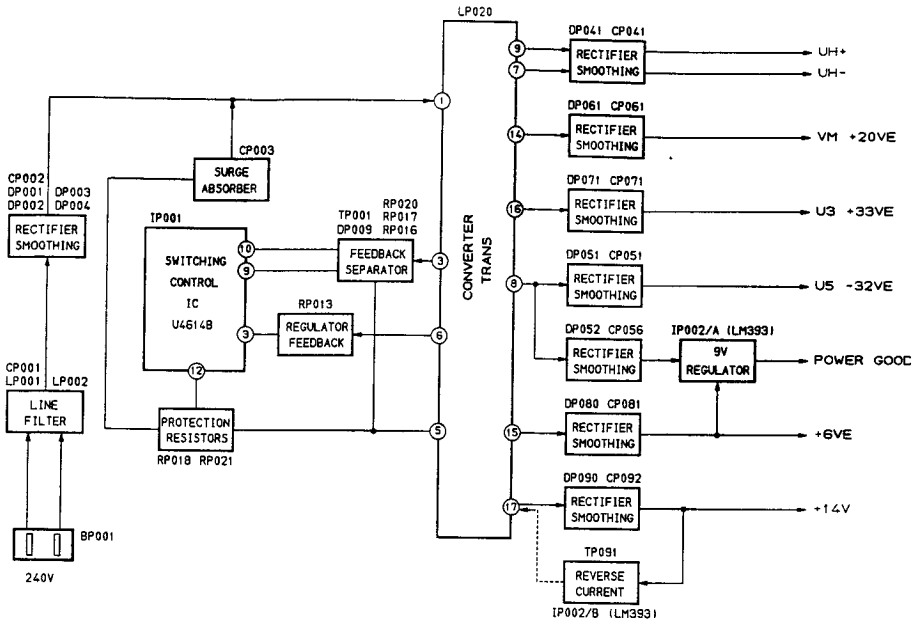
Fig. 11

6. PRINTED WIRING AND SCHEMATIC DIAGRAM

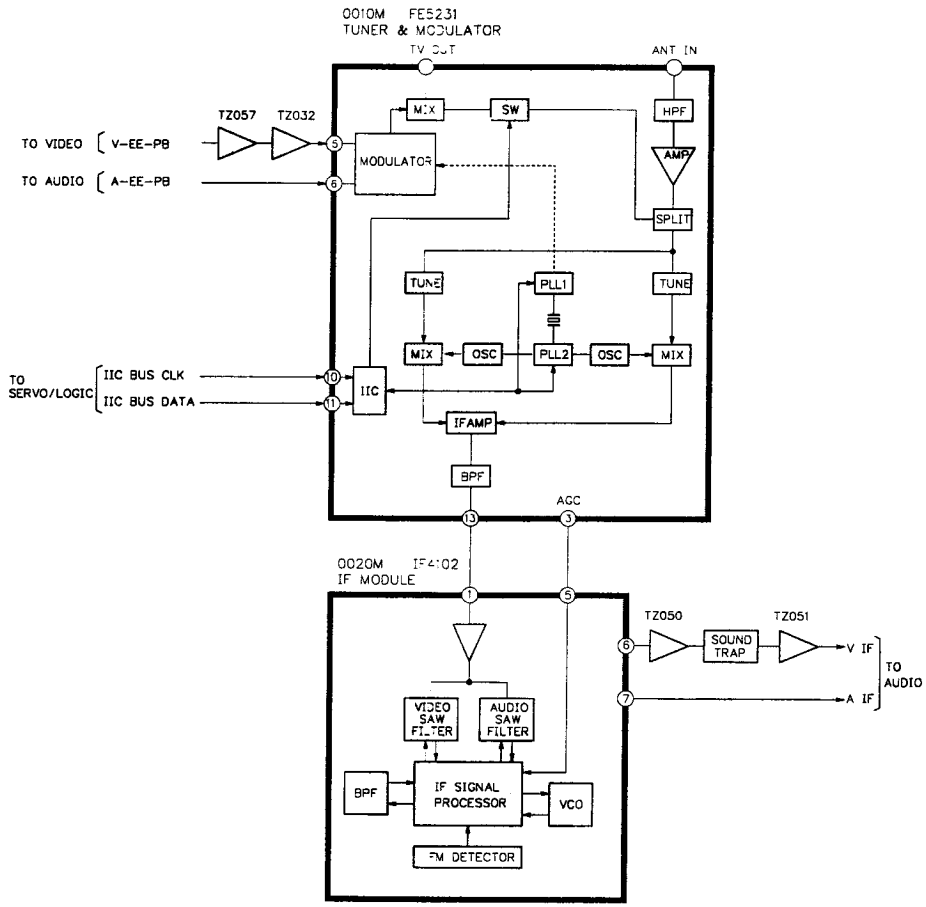


7. BLOCK DIAGRAM

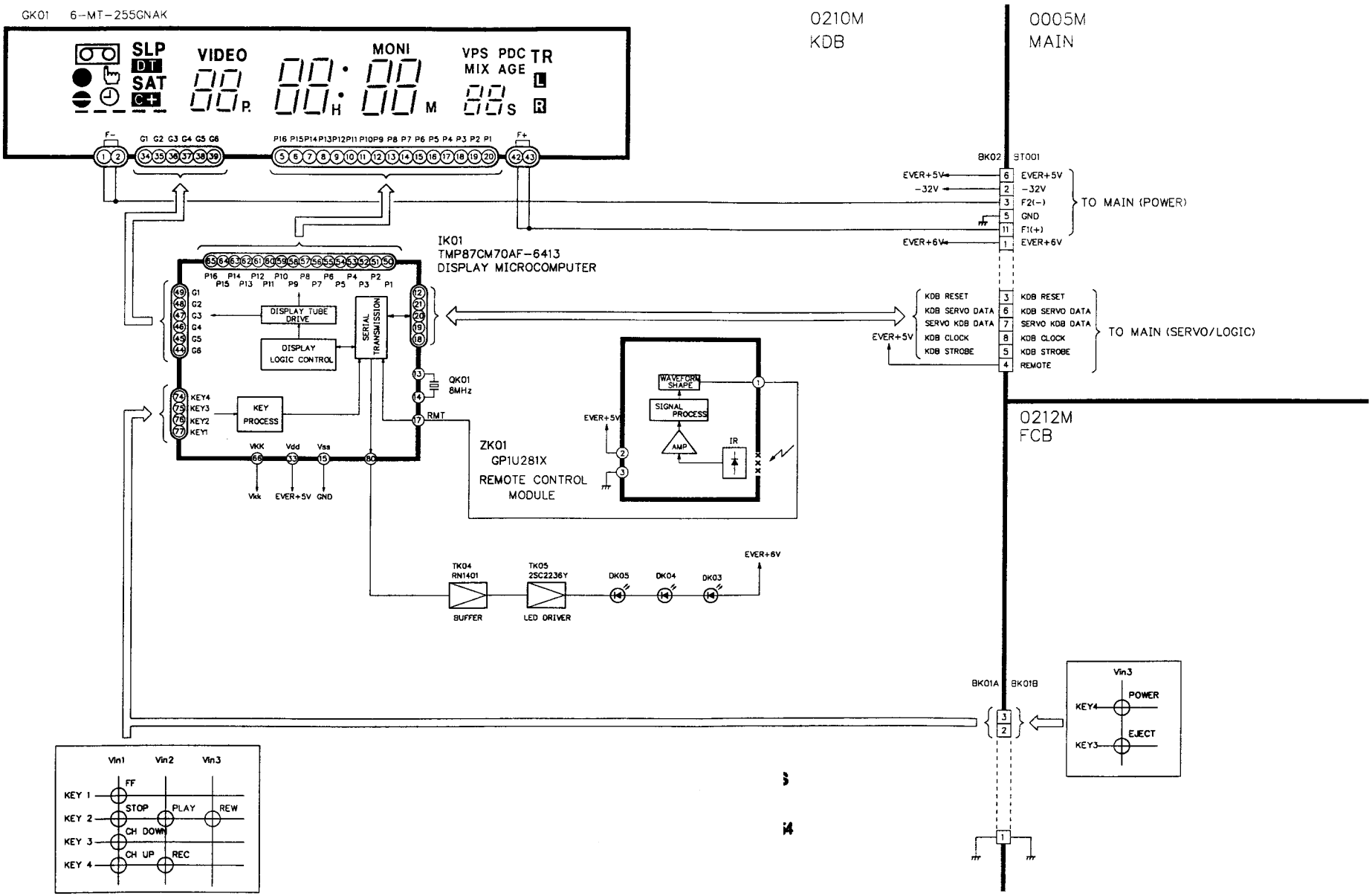
7-1. Power Block Diagram



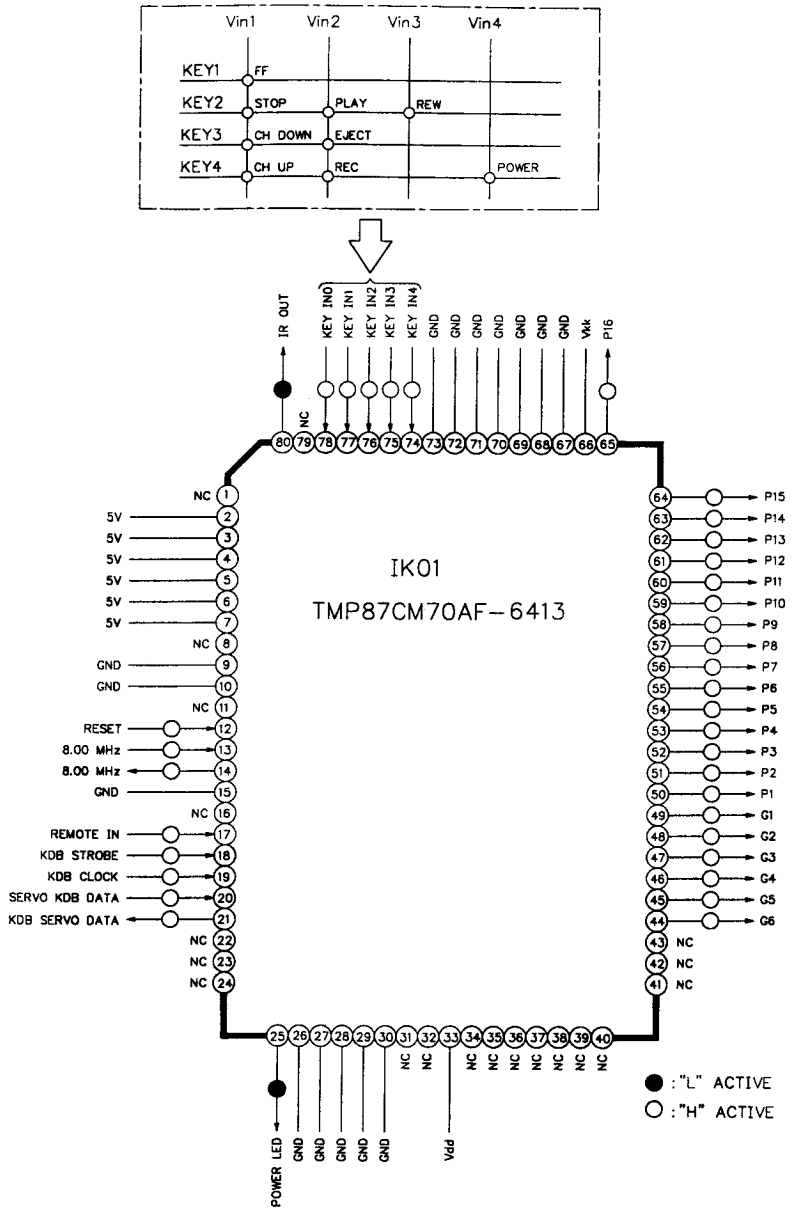
7-2. PIF Block Diagram



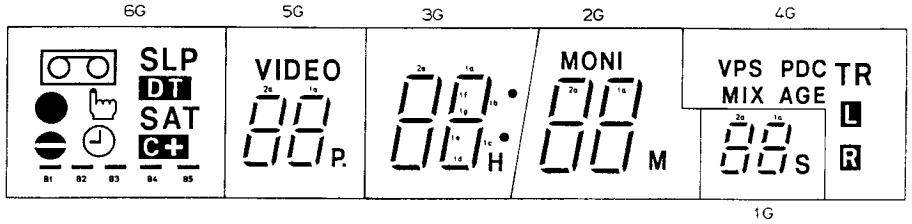
7-3. KDB Block Diagram



7-3-1. DISPLAY Microcomputer Terminal Function



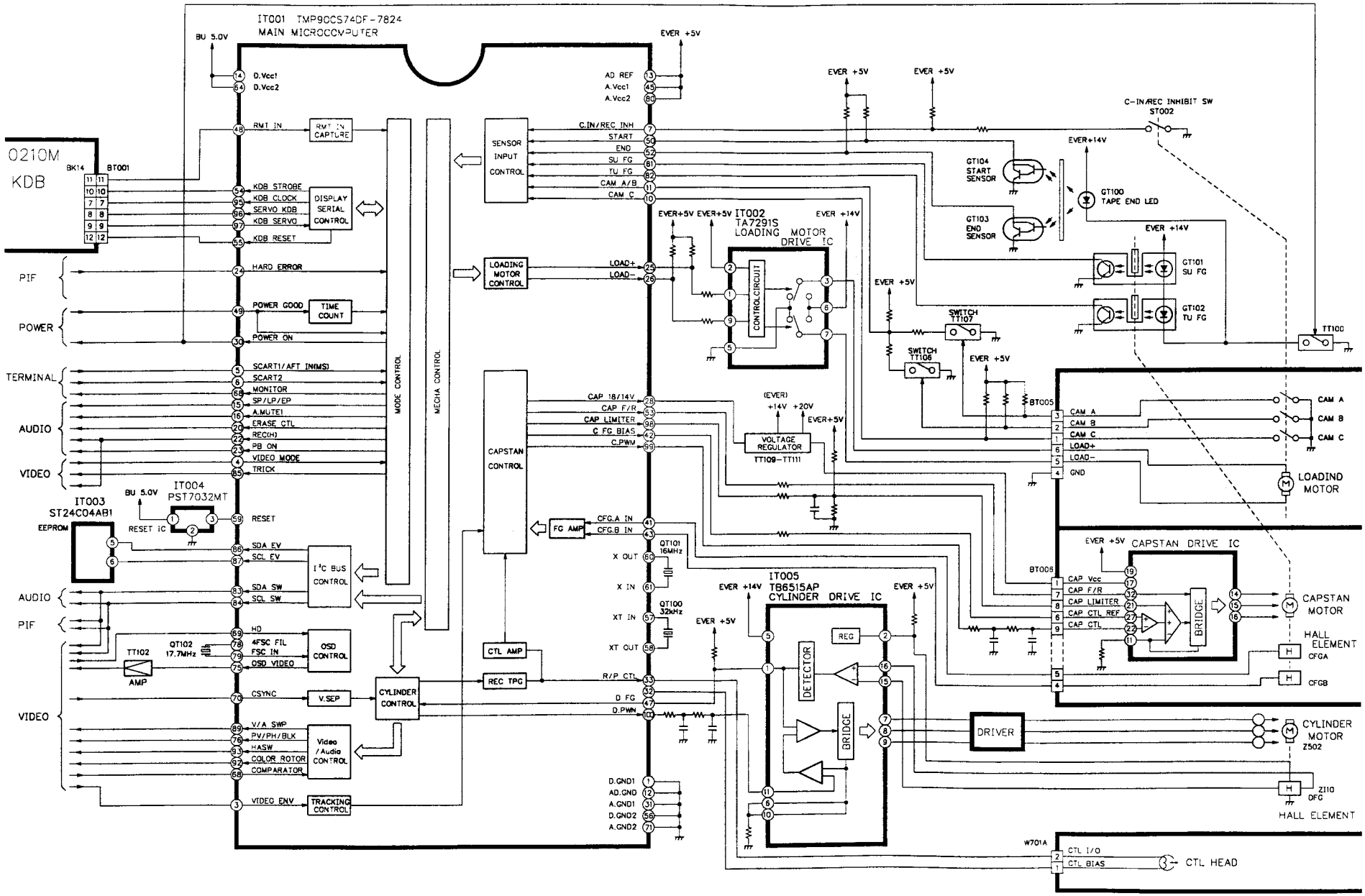
7-3-2. Key Display GX01 6-MT-255GNK

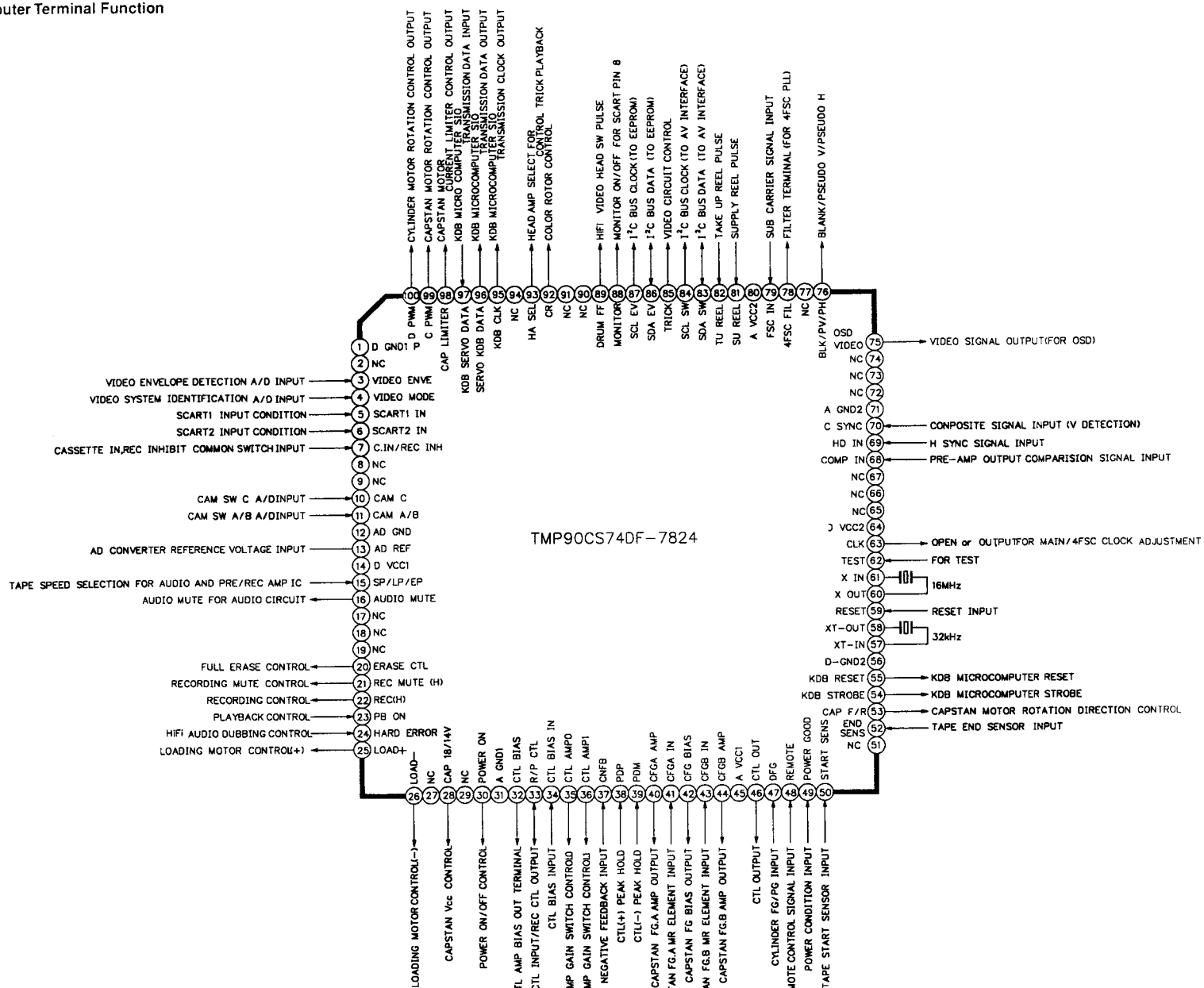


7-3-3. Display Pattern

	6G	5G	4G	3G	2G	1G
P1	◷	1d	VPS	1d	1d	1d
P2	⬬	1e	MIX	1e	1e	1e
P3	☜	1c	AGE	1c	1c	1c
P4	●	1g	PDC	1g	1g	1g
P5	P	1f	L	1f	1f	1f
P6	L	1b		1b	1b	1b
P7	S	1a	R	1a	1a	1a
P8	⊡	VIDEO	TR	H	M	S
P9	B5	2d		2d	2d	2d
P10	B4	2e		2e	2e	2e
P11	B3	2c		2c	2c	2c
P12	B2	2g		2g	2g	2g
P13	B1	2f		2f	2f	2f
P14	C+	2b		2b	2b	2b
P15	SAT	2a		2a	2a	2a
P16	DT	P.		col :	MONI	

7-4. Servo / Logic Block Diagram




TMP90CS74DF-7824
1 D GND1 P
2 NC
3 VIDEO ENVE
4 VIDEO MODE
5 SCART1 IN
6 SCART2 IN
7 C.IN/REC INH
8 NC
9 NC
10 CAM C
11 CAM A/B
12 AD GND
13 AD REF
14 D VCC1
15 SP/LP/EP
16 AUDIO MUTE
17 NC
18 NC
19 NC
20 ERASE CTL
21 REC MUTE (H)
22 REC(H)
23 PB ON
24 HARD ERROR
25 LOAD+
26 LOAD-
27 NC
28 CAP 18/14V
29 NC
30 POWER ON
31 A GND1
32 CTL BIAS
33 R/P CTL
34 CTL BIAS IN
35 CTL AMP0
36 CTL AMP1
37 CNFB
38 PDP
39 PDM
40 CFGA AMP
41 CFGA IN
42 CFG BIAS
43 CFGB IN
44 CFGB AMP
45 A VCC1
46 CTL OUT
47 DFG
48 REMOTE
49 POWER GOOD
50 START SENS
51 NC
52 END SENS
53 CAP F/R
54 KDB STROBE
55 KDB RESET
56 D-GND2
57 XT-IN
58 XT-OUT
59 RESET
60 X OUT
61 X IN
62 TEST
63 CLK
64 D VCC2
65 NC
66 NC
67 NC
68 COMP IN
69 HD IN
70 C SYNC
71 A GND2
72 NC
73 NC
74 NC
75 OSD VIDEO
76 BLK/PV/PH
77 NC
78 4FSC FIL
79 FSC IN
80 A VCC2
81 SU REEL
82 TU REEL
83 SDA SW
84 SCL SW
85 TRICK
86 SDA EV
87 SCL EV
88 MONITOR
89 DRUM FF
90 NC
91 NC
92 CR
93 HA SEL
94 NC
95 KDB CLK
96 SERVO KDB DATA
97 KDB SERVO DATA
98 CAP LIMITER
99 C PWM
100 D PWM
VIDEO ENVELOPE DETECTION A/D INPUT
VIDEO SYSTEM IDENTIFICATION A/D INPUT
SCART1 INPUT CONDITION
SCART2 INPUT CONDITION
CASSETTE IN,REC INHIBIT COMMON SWITCH INPUT
CAM SW C A/DINPUT
CAM SW A/B A/DINPUT
AD CONVERTER REFERENCE VOLTAGE INPUT
TAPE SPEED SELECTION FOR AUDIO AND PRE/REC AMP IC
AUDIO MUTE FOR AUDIO CIRCUIT
FULL ERASE CONTROL
RECORDING MUTE CONTROL
RECORDING CONTROL
PLAYBACK CONTROL
HIFI AUDIO DUBBING CONTROL
LOADING MOTOR CONTROL(+)
LOADING MOTOR CONTROL(-)
CAPSTAN Vcc CONTROL
POWER ON/OFF CONTROL
CTL AMP BIAS OUT TERMINAL
PLAY CTL INPUT/REC CTL OUTPUT
CTL BIAS INPUT
CTL AMP GAIN SWITCH CONTROL
CTL AMP GAIN SWITCH CONTROL
CTL NEGATIVE FEEDBACK INPUT
CTL(+) PEAK HOLD
CTL(-) PEAK HOLD
CAPSTAN FG.A AMP OUTPUT
CAPSTAN FG.A MR ELEMENT INPUT
CAPSTAN FG BIAS OUTPUT
CAPSTAN FG.B MR ELEMENT INPUT
CAPSTAN FG.B AMP OUTPUT
CTL OUTPUT
CYLINDER FG/PG INPUT
REMOTE CONTROL SIGNAL INPUT
POWER CONDITION INPUT
TAPE START SENSOR INPUT
VIDEO SIGNAL OUTPUT(FOR OSD)
CONPOSITE SIGNAL INPUT (V DETECTION)
H SYNC SIGNAL INPUT
PRE-AMP OUTPUT COMPARISION SIGNAL INPUT
OPEN or OUTPUTFOR MAIN/4FSC CLOCK ADJUSTMENT
FOR TEST
16MHz
RESET INPUT
32kHz
KDB MICROCOMPUTER RESET
KDB MICROCOMPUTER STROBE
CAPSTAN MOTOR ROTATION DIRECTION CONTROL
TAPE END SENSOR INPUT
CYLINDER MOTOR ROTATION CONTROL OUTPUT
CAPSTAN MOTOR ROTATION CONTROL OUTPUT
CAPSTAN MOTOR CURRENT LIMITER CONTROL OUTPUT
KDB MICRO COMPUTER SIO TRANSMISSION DATA INPUT
KDB MICROCOMPUTER SIO TRANSMISSION DATA OUTPUT
KDB MICROCOMPUTER SIO TRANSMISSION CLOCK OUTPUT
HEAD AMP SELECT FOR CONTROL TRICK PLAYBACK
COLOR ROTOR CONTROL
HIFI VIDEO HEAD SW PULSE
MONITOR ON/OFF FOR SCART PIN 8
I²C BUS CLOCK (TO EEPROM)
I²C BUS DATA (TO EEPROM)
VIDEO CIRCUIT CONTROL
I²C BUS CLOCK (TO AV INTERFACE)
I²C BUS DATA (TO AV INTERFACE)
TAKE UP REEL PULSE
SUPPLY REEL PULSE
SUB CARRIER SIGNAL INPUT
FILTER TERMINAL (FOR 4FSC PLL)
BLANK/PSEUDO V/PSEUDO H

7-4-2. Main Microcomputer Output Polarity

Pin No. / MODE / Pin Name	Act.	SLOT IN	SLOT OUT	Load -ing	Un-load -ing
16 A. MUTE1	H	L	L	L	L
25 LOAD FWD	L	L	H	L	H
26 LOAD REV	L	H	L	H	L
30 POWER ON	H	H	H	H	H
33 R/P CTL	⊓	-	-	-	-
46 CTL OUT	⊓	L	L	L	L
53 CAP F/R	-	L	H	L	H
54 DSP STB	⊓	⊓	←	←	←
67 S DATA	▥	▥	←	←	←
76 PV/PH/BLNK	4ST	2ST	←	←	←
83 I2C DATA1	▥	▥	←	←	←
84 I2C CLOCK1	▥	▥	←	←	←
86 I2C DATA2	▥	▥	←	←	←
87 I2C CLOCK2	▥	▥	←	←	←
88 S CLK	▥	▥	←	←	←
89 D-FF	⊓	⊓	←	←	←
91 LP SEARCH	L	H	H	H	H
92 CR	⊓	⊓	←	←	←
95 DSP CLK	▥	▥	←	←	←
96 DATA M→DSP	▥	▥	←	←	←
98 CAP LIMITER	PWM	L	L	PWM	←
99 C-ERR	PWM	PWM	PWM	PWM	←
100 D-ERR	PWM	L	L	PWM	←

7-4-3. Logic Mode Shift Table

KEY / MODE	POWER	STOP	FF	REW	
POWER OFF	ON	×	×	×	
STOP	OFF	–	○	○	
FF	OFF	○	CUE	○	
REW	OFF	○	○	REV	
CUE	OFF	○	※1	REV	
REV	OFF	○	CUE	※2	
PLAY	OFF	○	CUE	REV	
STILL	OFF	○	CUE	REV	FR
SLOW	OFF	○	CUE	REV	
REC	OFF	○	×	×	
REC PAUSE	OFF	○	×	×	
VISS MARK	OFF	○	×	×	
TIMER STBY	ON	×	×	×	
TIMER REC	ON	×	×	×	

※1 : If pressed within 1 second, FF.
※2 : If pressed within 1 second, REW.

MODE / Pin Name	Act.	SLOT IN	SLOT OUT	Load -ing	Un- load -ing	STOP	STAN D-BY	FF	REW	PLAY SP LP	X2 SP LP	CUE SP LP	REV SP LP	STILL SP LP	SLOW SP LP	REC SP LP	REC PAUSE SP LP	P
A. MUTE1	H	L	L	L	L	L	L	L	L	L	H	H	H	H	H	L	L	
LOAD FWD	L	L	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	
LOAD REV	L	H	L	H	L	H	H	H	H	H	H	H	H	H	H	H	H	
POWER ON	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
R/P CTL	⊓⊔	-	-	-	-	-	-	-	-	-	-	-	-	-	-	⊓⊔	-	
CTL OUT	⊓⊔	L	L	L	L	L	L	⊓⊔	←	←	←	←	←	L	⊓	⊓⊔	L	
CAP F/R	-	L	H	L	H	H	H	L	H	L	L	L	H	L	⊓	L	L	
DSP STB	⊓	⊓	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	
S DATA	▥	▥	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	
PV/PH/BLNK	4ST	2ST	←	←	←	←	←	←	←	4ST	←	←	←	←	←	←	←	
I2C DATA1	▥	▥	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	
I2C CLOCK1	▥	▥	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	
I2C DATA2	▥	▥	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	
I2C CLOCK2	▥	▥	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	
S CLK	▥	▥	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	
D-FF	⊓⊔	⊓⊔	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	OI
LP SEARCH	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
CR	⊓⊔	⊓⊔	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	
DSP CLK	▥	▥	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	
DATA M→DSP	▥	▥	←	←	←	←	←	←	←	←	←	←	←	←	←	←	←	
CAP LIMITER	PWM	L	L	PWM	←	L	PWM	←	←	←	←	←	←	L	PWM	←	←	
C-ERR	PWM	PWM	PWM	PWM	←	L	L	PWM	←	←	←	←	←	L	PWM	←	L	
D-ERR	PWM	L	L	PWM	←	L	PWM	←	←	←	←	←	←	←	←	←	←	

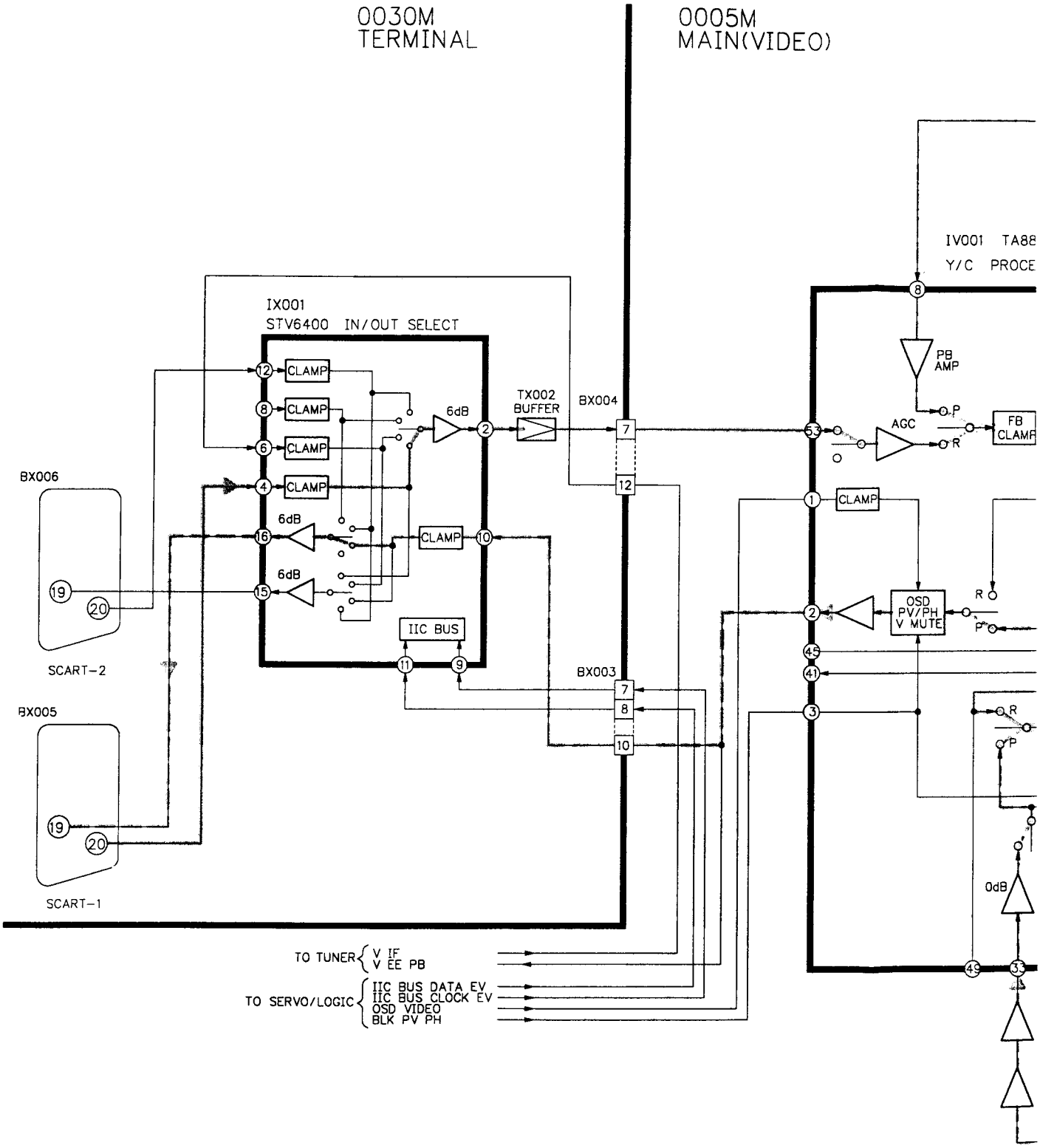
KEY /	POWER	STOP	FF	REW	PLAY	PAUSE	SLOW	REC	EJECT	REMAIN COUNT/TIMER	INDEX	COUNTER RESET
R OFF	ON	×	×	×	×	×	×	×	○	×	×	×
	OFF	–	○	○	○	×	×	○	○	○	SERCH	○
	OFF	○	CUE	○	○	×	×	×	○	○	×	○
	OFF	○	○	REV	○	×	×	×	○	○	×	○
	OFF	○	※1	REV	○	×	×	×	○	○	×	○
	OFF	○	CUE	※2	○	×	×	×	○	○	×	○
	OFF	○	CUE	REV	×	STILL	○	×	○	○	SERCH	○
L	OFF	○	CUE	REV	FRAME ADV.	PLAY	FRAME ADV.	R. PAUSE	○	○	×	○
	OFF	○	CUE	REV	○	STILL	○	×	○	○	×	○
	OFF	○	×	×	×	R. PAUSE	×	–	×	○	V. MARK	○
PAUSE	OFF	○	×	×	×	REC	×	×	×	○	×	○
MARK	OFF	○	×	×	×	×	×	×	×	×	–	○
R STBY	ON	×	×	×	×	×	×	×	×	×	×	×
R REC	ON	×	×	×	×	×	×	×	×	○	V. MARK	○

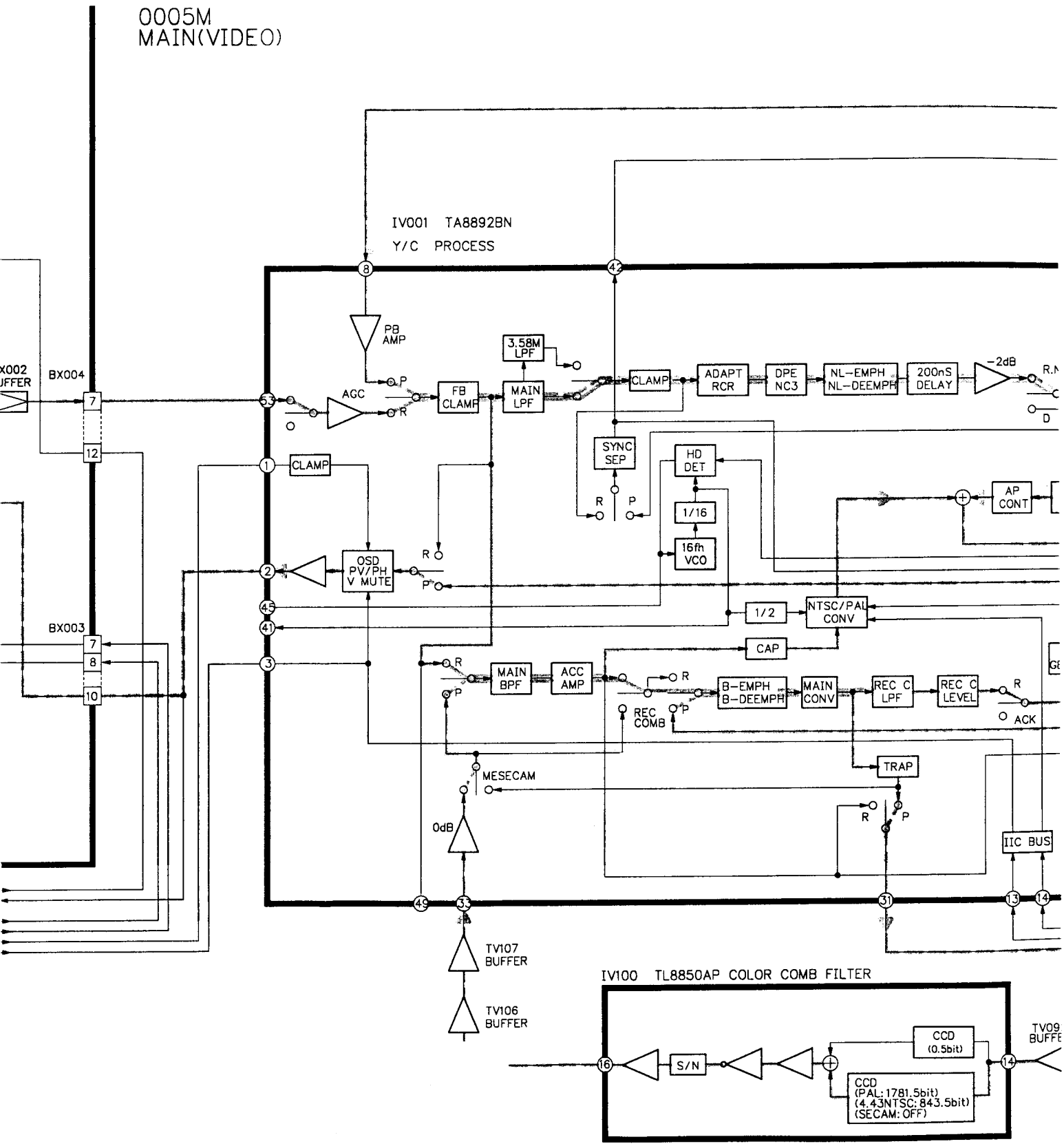
If pressed within 1 second, FF. If not, all CUE.
If pressed within 1 second, REW. If not, all REVIEW.

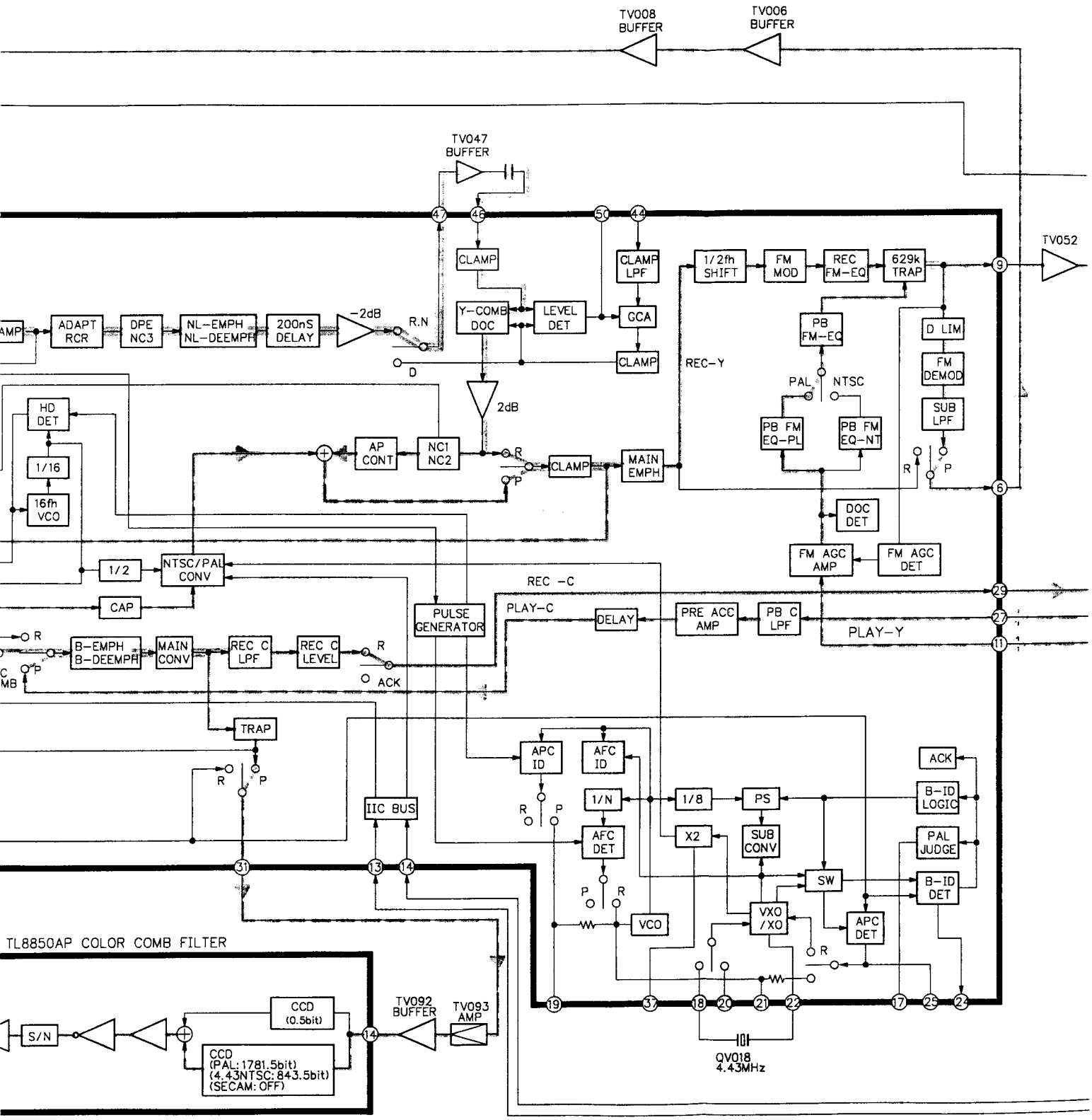
X2 SP	X2 LP	CUE SP	CUE LP	REV SP	REV LP	STILL SP	STILL LP	SLOW SP	SLOW LP	REC SP	REC LP	REC PAUSE SP	REC PAUSE LP	POWER OFF	INIT -IAL
H		H		H		H		H		L		L		H	H
H		H		H		H		H		H		H		H	H
H		H		H		H		H		H		H		H	H
H		H		H		H		H		H		L		L	
-		-		-		-		-		⊓⊓		-		-	OPEN
←		←		←		L		⊥⊓		⊓⊓		L		L	L
L		L		H		L		⊥⊓		L		L		H	L
←		←		←		←		←		←		←		←	L
←		←		←		←		←		←		←		←	L
←		←		←		←		←		←		←		L	4ST
←		←		←		←		←		←		←		←	H
←		←		←		←		←		←		←		←	H
←		←		←		←		←		←		←		←	H
←		←		←		←		←		←		←		←	H
←		←		←		←		←		←		←		←	L
←		←		←		←		←		←		←		OPEN	OPEN
H		H		H		H		H		H		H		H	L
←		←		←		←		←		←		←		L	L
←		←		←		←		←		←		←		←	L
←		←		←		←		←		←		←		←	L
←		←		←		L		PWM		←		←		L	500m
←		←		←		L		PWM		←		L		L	L
←		←		←		←		←		←		←		L	L

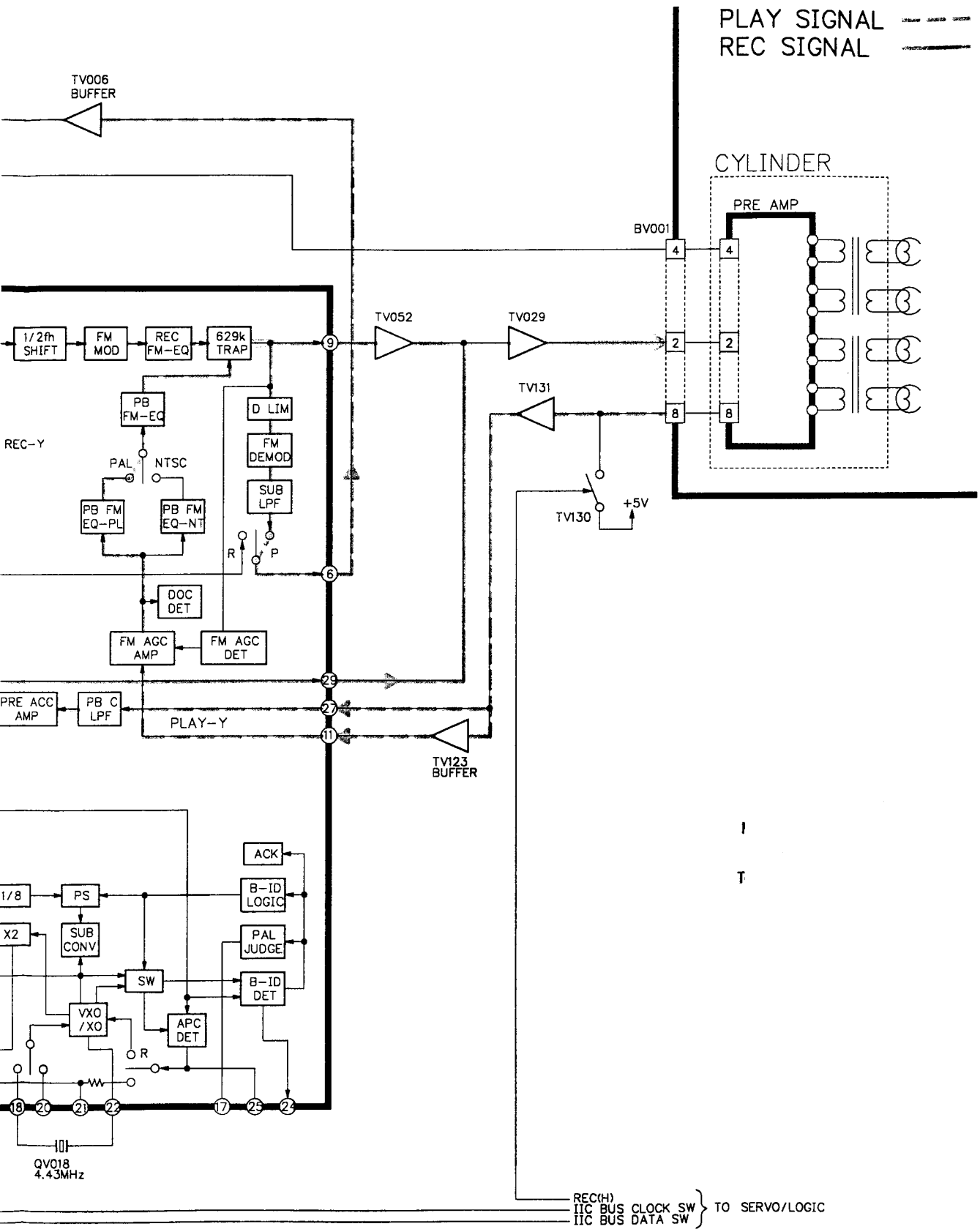
	REC	EJECT	REMAIN COUNT/TIMER	INDEX	COUNTER RESET	TAPE END	TAPE START
	×	○	×	×	×	×	×
	○	○	○	SERCH	○	S. REW	S. FF
	×	○	○	×	○	STOP	×
	×	○	○	×	○	×	STOP
	×	○	○	×	○	REW	×
	×	○	○	×	○	×	STOP
	×	○	○	SERCH	○	REW	×
.	R. PAUSE	○	○	×	○	REW	×
	×	○	○	×	○	REW	×
	−	×	○	V. MARK	○	REW	×
	×	×	○	×	○	×	×
	×	×	×	−	○	REW	×
	×	×	×	×	×	×	×
	×	×	○	V. MARK	○	STBY	×

7-5. Video Block Diagram

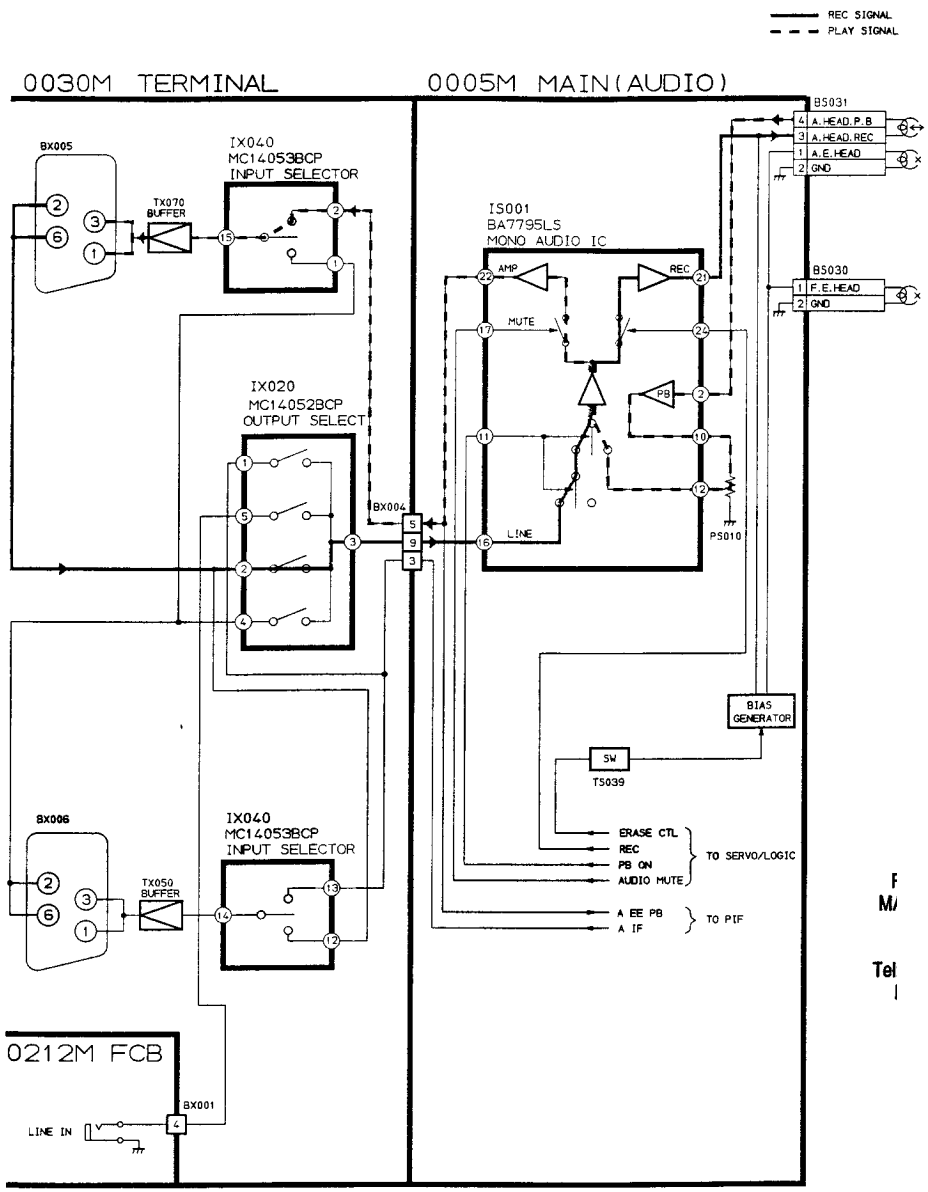



0005M
MAIN(VIDEO)
IV001 TA8892BN
Y/C PROCESS
PB AMP
3.58M LPF
AGC
FB CLAMP
MAIN LPF
CLAMP
ADAPT RCR
DPE NC3
NL-EMPH NL-DEEMPH
200nS DELAY
-2dB
SYNC SEP
HD DET
1/16
16fh VCO
AP CONT
OSD PV/PH V MUTE
1/2
NTSC/PAL CONV
CAP
MAIN BPF
ACC AMP
B-EMPH B-DEEMPH
MAIN CONV
REC C LPF
REC C LEVEL
ACK
REC COMB
TRAP
MESECAM
0dB
IIC BUS
TV107 BUFFER
TV106 BUFFER
BX004
BX003
IV100 TL8850AP COLOR COMB FILTER
S/N
CCD (0.5bit)
CCD (PAL:1781.5bit) (4.43NTSC:843.5bit) (SECAM:OFF)

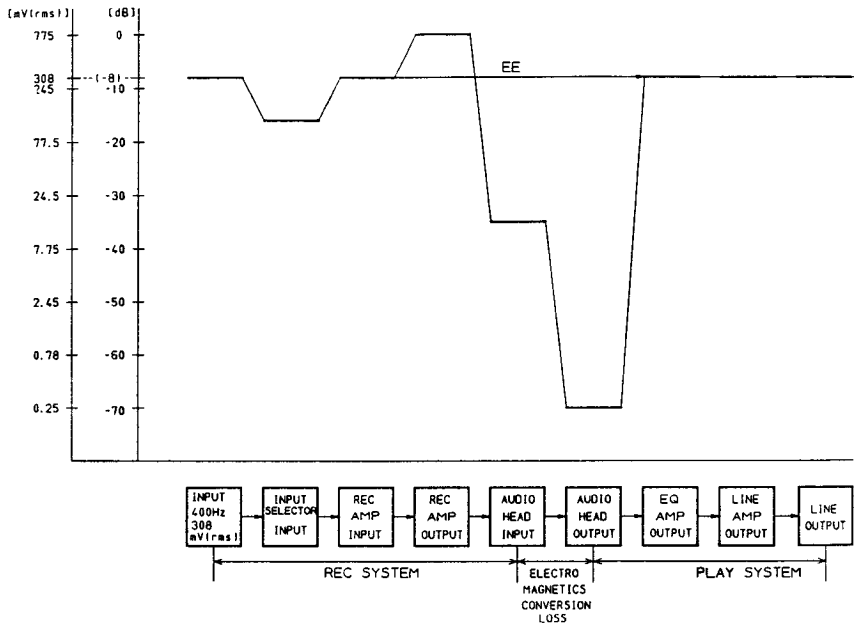

TV008 BUFFER
TV006 BUFFER
TV047 BUFFER
TV052
CLAMP
CLAMP LPF
1/2fh SHIFT
FM MOD
REC FM-EQ
629k TRAP
Y-COMB DOC
LEVEL DET
GCA
CLAMP
ADAPT RCR
DPE NC3
NL-EMPH NL-DEEMPH
200nS DELAY
-2dB
R.N
D
2dB
REC-Y
PB FM-EQ
D LIM
FM DEMOD
PAL
NTSC
PB FM EQ-PL
PB FM EQ-NT
SUB LPF
HD DET
1/16
16fh VCO
AP CONT
NC1 NC2
CLAMP
MAIN EMPH
DOC DET
FM AGC AMP
FM AGC DET
1/2
NTSC/PAL CONV
CAP
REC -C
PLAY-C
PULSE GENERATOR
DELAY
PRE ACC AMP
PB C LPF
PLAY-Y
B-EMPH B-DEEMPH
MAIN CONV
REC C LPF
REC C LEVEL
ACK
TRAP
IIC BUS
APC ID
AFC ID
1/N
1/8
PS
X2
SUB CONV
AFC DET
SW
VXO /XO
VCO
APC DET
ACK
B-ID LOGIC
PAL JUDGE
B-ID DET
TL8850AP COLOR COMB FILTER
S/N
CCD (0.5bit)
CCD (PAL:1781.5bit) (4.43NTSC:843.5bit) (SECAM:OFF)
TV092 BUFFER
TV093 AMP
QV018 4.43MHz


PLAY SIGNAL
REC SIGNAL
TV006
BUFFER
CYLINDER
PRE AMP
BV001
TV052
TV029
TV131
TV130
+5V
1/2fh
SHIFT
FM
MOD
REC
FM-EQ
629k
TRAP
PB
FM-EQ
D LIM
FM
DEMOD
SUB
LPF
REC-Y
PAL
NTSC
PB FM
EQ-PL
PB FM
EQ-NT
R
P
DOC
DET
FM AGC
AMP
FM AGC
DET
PRE ACC
AMP
PB C
LPF
PLAY-Y
TV123
BUFFER
ACK
1/8
PS
B-ID
LOGIC
X2
SUB
CONV
PAL
JUDGE
SW
B-ID
DET
VXO
/XO
APC
DET
R
QV018
4.43MHz
REC(H)
IIC BUS CLOCK SW
IIC BUS DATA SW
TO SERVO/LOGIC

7-6. AudioBlock Diagram



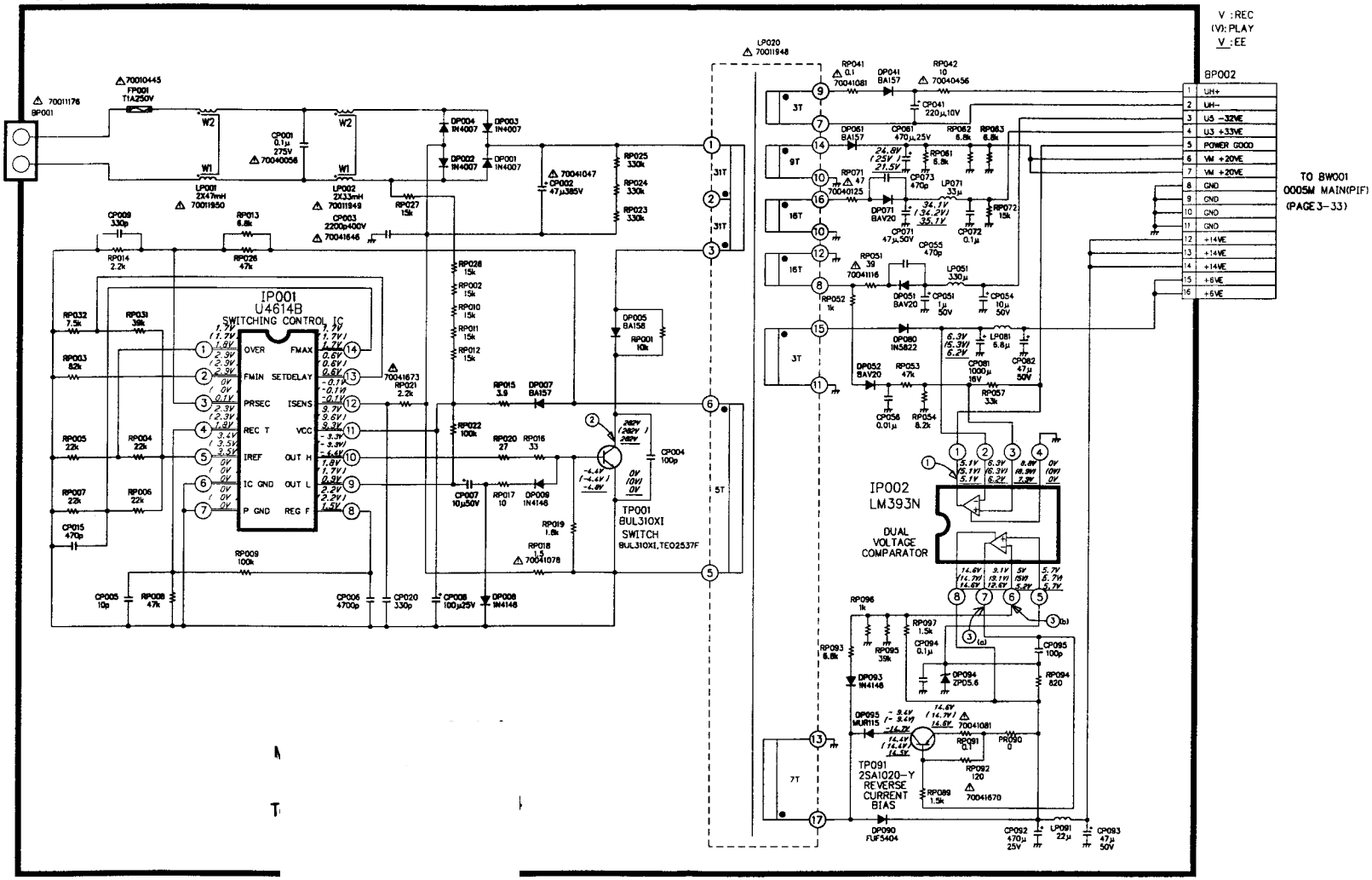
7-6-1. Conventional Audio Level Chart



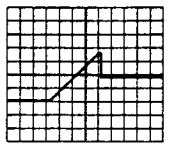
8. CIRCUIT DIAGRAMS

8-1. Power Circuit Diagram

0150M POWER

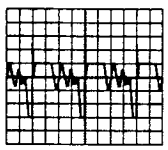


① IP002, Pin ① E-7



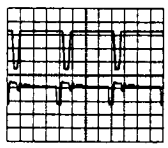
START-UP
Vcc
V:5V/div
H:500ms/div

② TP001 COLLECTOR D-5



V:100V/div
H:10μs/div

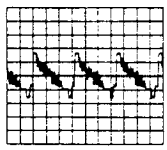
③ IP002
(a) Pin ⑦ F-8
(b) Pin ⑥ F-8



(a)
(b)
V:5V/div
H:10ms/div

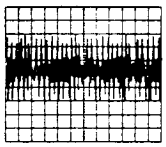
8-2. PIF Circuit Diagram

① 0020M, Pin ⑥ F-7



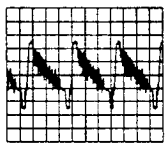
VIDEO OUT
V:1V/div
H:20μs/div

② 0020M, Pin ⑦ F-7



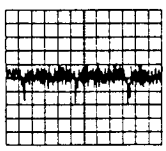
AUDIO
V:20mV/div
H:5ms/div

③ 0010M, Pin ⑤ B-8



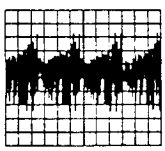
MOD V IN
V:200mV/div
H:20μs/div

④ 0010M, Pin ⑥ C-7

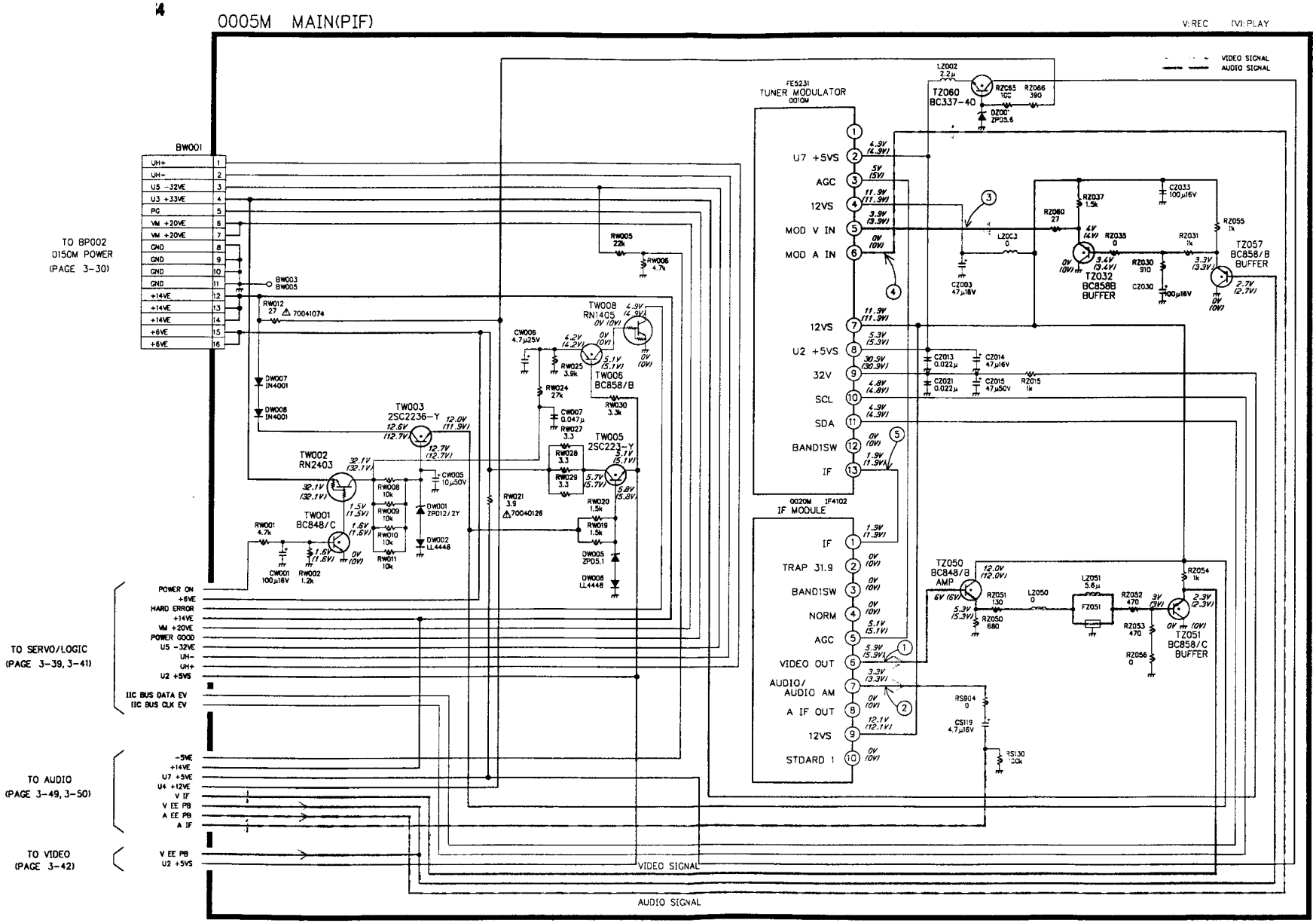


MOD A IN
V:500mV/div
H:5ms/div

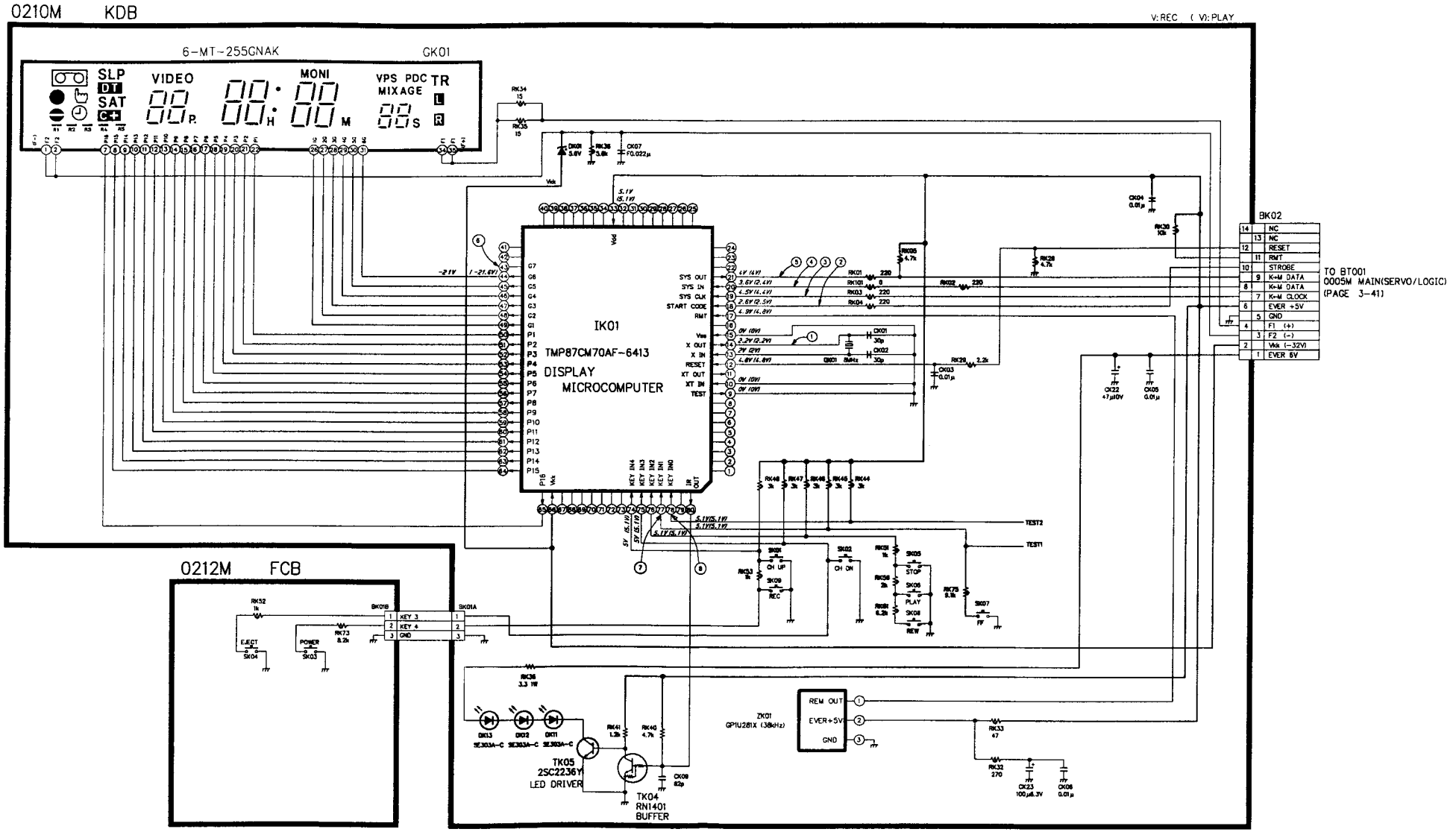
⑤ 0010M, Pin ⑬ D-7

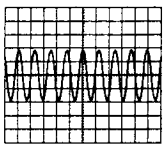
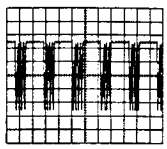
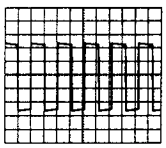
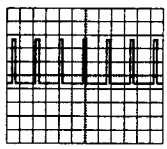
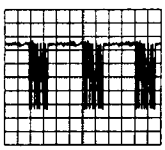
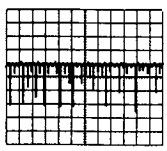
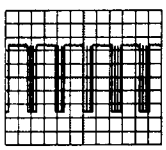
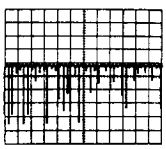


IF
V:20mV/div
H:20μs/div

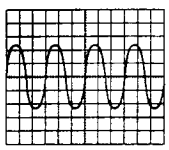
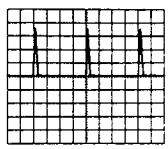
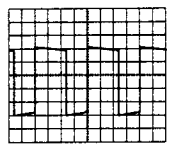
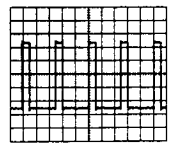
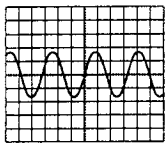
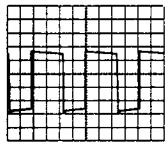
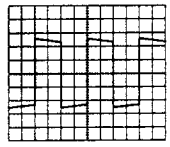
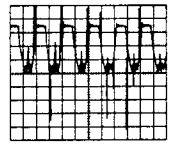
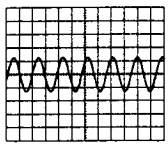
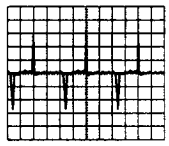
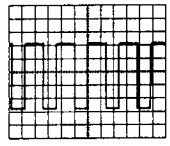
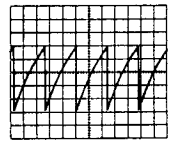
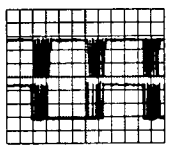
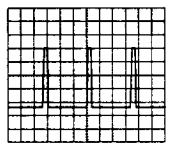
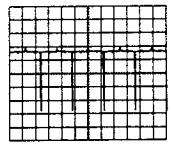
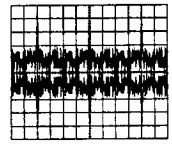
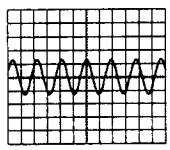
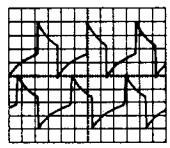
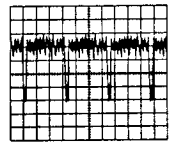
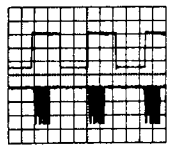
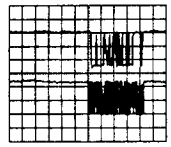
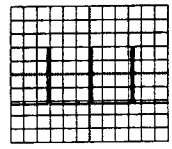

0005M MAIN(PIF)
V:REC (V):PLAY
VIDEO SIGNAL
AUDIO SIGNAL
BW001
TO BP002
0150M POWER
(PAGE 3-30)
FE5231
TUNER MODULATOR
0010M
TZ060
BC337-40
TZ032
BC858B
BUFFER
TZ057
BC858/B
BUFFER
TZ051
BC858/C
BUFFER
TZ050
BC848/B
AMP
TW001
BC848/C
TW002
RN2403
TW003
2SC2236-Y
TW005
2SC223-Y
TW006
BC858/B
TW008
RN1405
0020M IF4102
IF MODULE
U7 +5VS
AGC
12VS
MOD V IN
MOD A IN
U2 +5VS
32V
SCL
SDA
BAND1SW
IF
TRAP 31.9
NORM
VIDEO OUT
AUDIO/
AUDIO AM
A IF OUT
STDARD 1
TO SERVO/LOGIC
(PAGE 3-39, 3-41)
TO AUDIO
(PAGE 3-49, 3-50)
TO VIDEO
(PAGE 3-42)
POWER ON
HARD ERROR
POWER GOOD
IIC BUS DATA EV
IIC BUS CLK EV
V IF
V EE PB
A EE PB
A IF
VIDEO SIGNAL
AUDIO SIGNAL

8-3. KDB Circuit Diagram

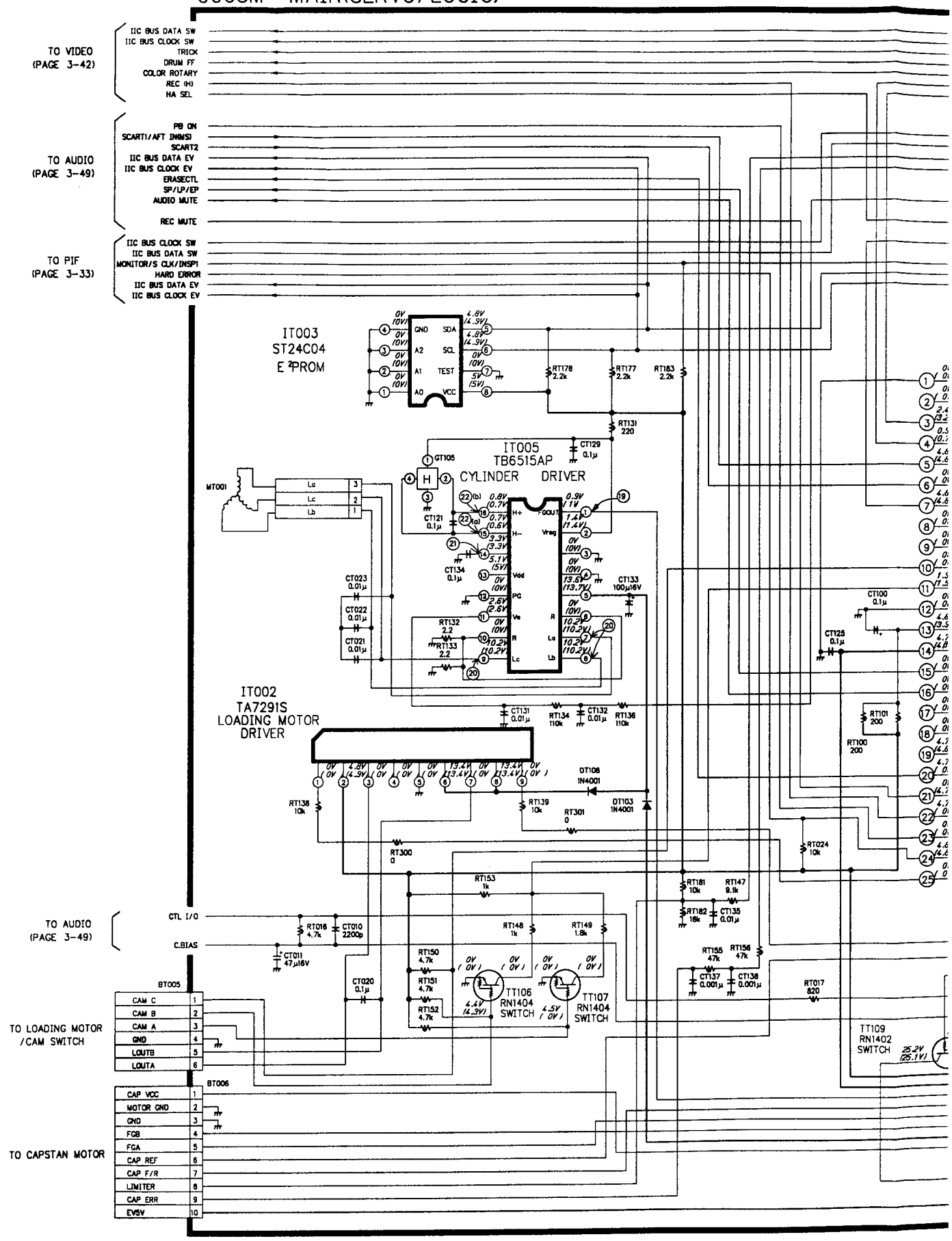


① IK01,Pin ⑭ D-7  X-OUT V:1V/div H:0.1μs/div	⑤ IK01, Pin ㉑ C-6  DATA OUT V:1V/div H:10ms/div
② IK01,Pin ⑱ C-7  START CODE V:1V/div H:10ms/div	⑥ IK01, Pin ㊸ C-4  V:1V/div H:500μs/div
③ IK01,Pin ⑲ C-7  CLOCK V:1V/div H:5ms/div	⑦ IK01, Pin ㊼ E-5  V:200mV/div H:5ms/div
④ IK01, Pin ⑳ C-7  DATA IN V:1V/div H:10μs/div	⑧ IK01, Pin ㊽ E-6  V:200mV/div H:5ms/div

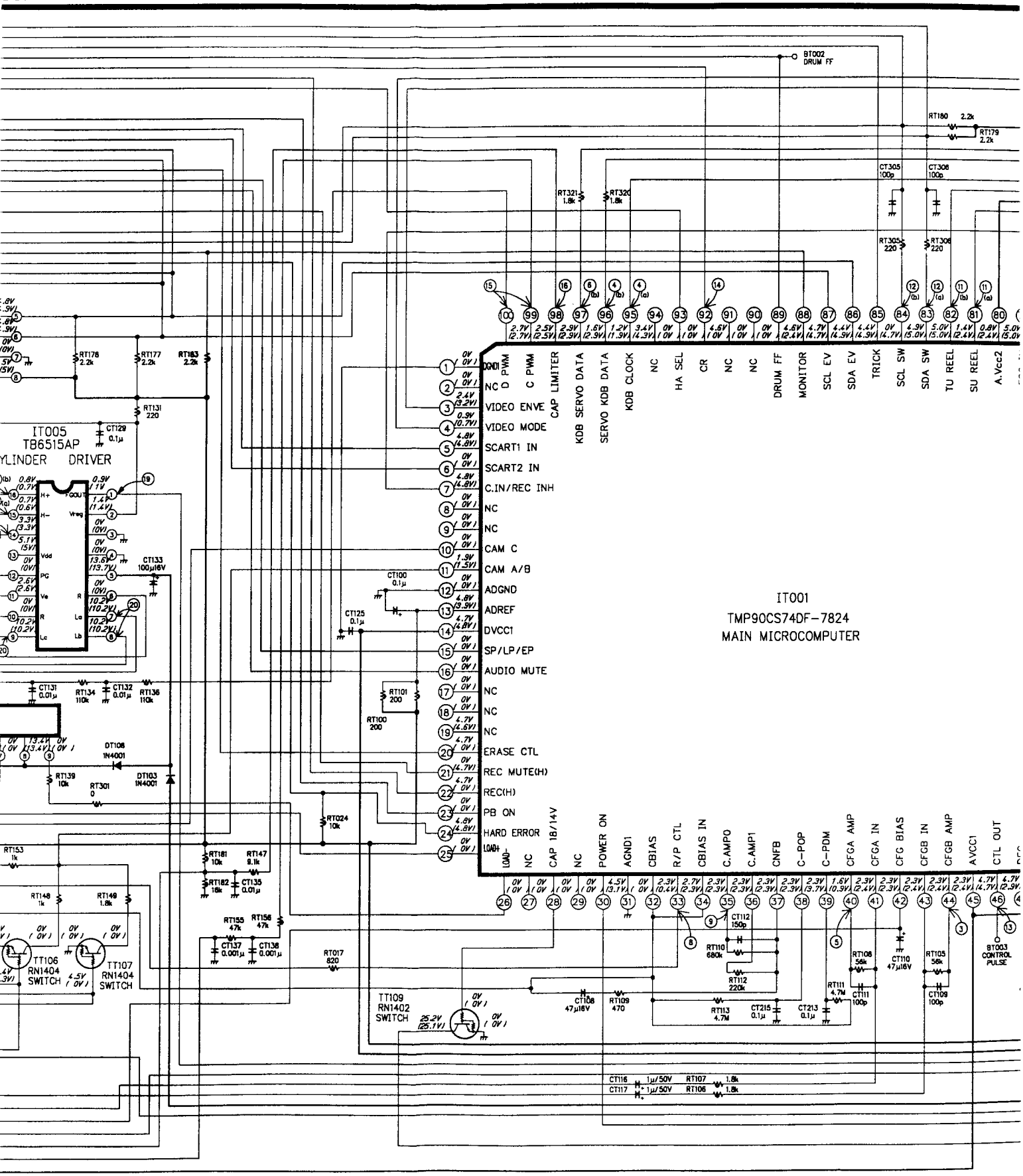
8-4. Servo/ Logic Circuit Diagram

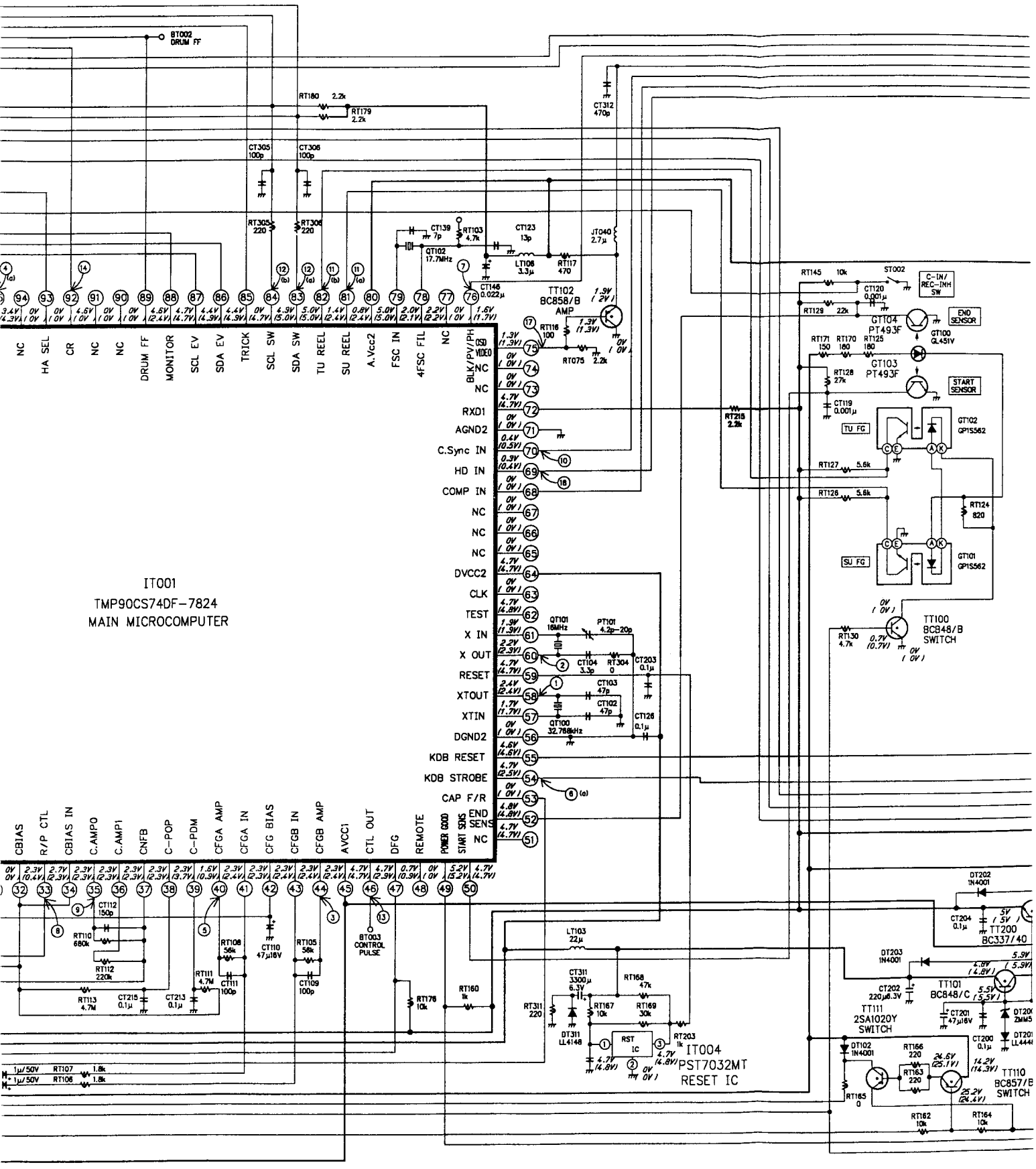
① IT001, Pin ⑱ E-10  XT-OUT V:1V/div H:10μs/div	⑦ IT001, Pin ⑯ B-10  PV/PH/BLK STILL V:1V/div H:5ms/div	⑬ IT001, Pin ⑯ F-9  CTL OUT V:1V/div H:10ms/div	⑲ IT005, Pin ① D-4  FoOUT V:1V/div H:2ms/div
② IT001,Pin ⑳ E-10  X–OUT V:1V/div H:0.02μs/div	⑧ IT001, Pin ㉝ F-7  R/P CTL (REC) V:1V/div H:10ms/div	⑭ IT001, Pin ⑫ B-8  CR (SP) V:1V/div H:10ms/div	⑳ IT005, Pin ⑦, ⑧ D-4 Pin ⑨ D-3  La, Lb, Lc V:2V/div H:5ms/div
③ IT001, Pin ㊹ F-9  CPGB.AMP V:500mV/div H:500μs/div	⑨ IT001, Pin ㉟ F-8  C AMP0 (SP) V:500mV/div H:10ms/div	⑮ IT001, Pin ⑨⑨, ⑩⓪ B-6  CPWM V:1V/div H:10μs/div	㉑ IT005, Pin ⑭ D-3  V:1V/div H:50ms/div
④ IT001 (a) Pin ⑨⑤ (SCLK0) B-7 (b) Pin ⑨⑥ (SDA OUT) B-7  (a) (b) V:2V/div H:5ms/div	⑩ IT001, Pin ⑦⓪ C-10  CSYNC V:1V/div H:20μs/div	⑯ IT001, Pin ⑨⑧ B-7  CAP V:500mV/div H:20μs/div	㉒ IT005 (a) Pin ⑮ (H–) D-3 (b) Pin ⑯ (H+) D-3  (a) (b) V:100mV/div H:10ms/div
⑤ IT001, Pin ㊵ F-8  CPGA.AMP V:200mV/div H:500μs/div	⑪ IT001 (a) Pin ⑧① (SU FG) B-9 (b) Pin ⑧② (TU FG) B-9  (a) (b) V:2V/div H:200ms/div	⑰ IT001, Pin ⑦⑤ C-10  OSD VIDEO V:50mV/div H:20μs/div	
⑥ IT001 (a) Pin ⑨④ (STB) E-10 (b) Pin ⑨⑦ (SDA IN) B-7  (a) (b) V:2V/div H:5ms/div	⑫ IT001 (a) Pin ⑧③ (SDA1) B-9 (b) Pin ⑧④ (SCL1) B-9  (a) (b) V:2V/div H:200μs/div	⑱ IT001, Pin ⑥⑨ D-10  HD IN V:1V/div H:20μs/div	

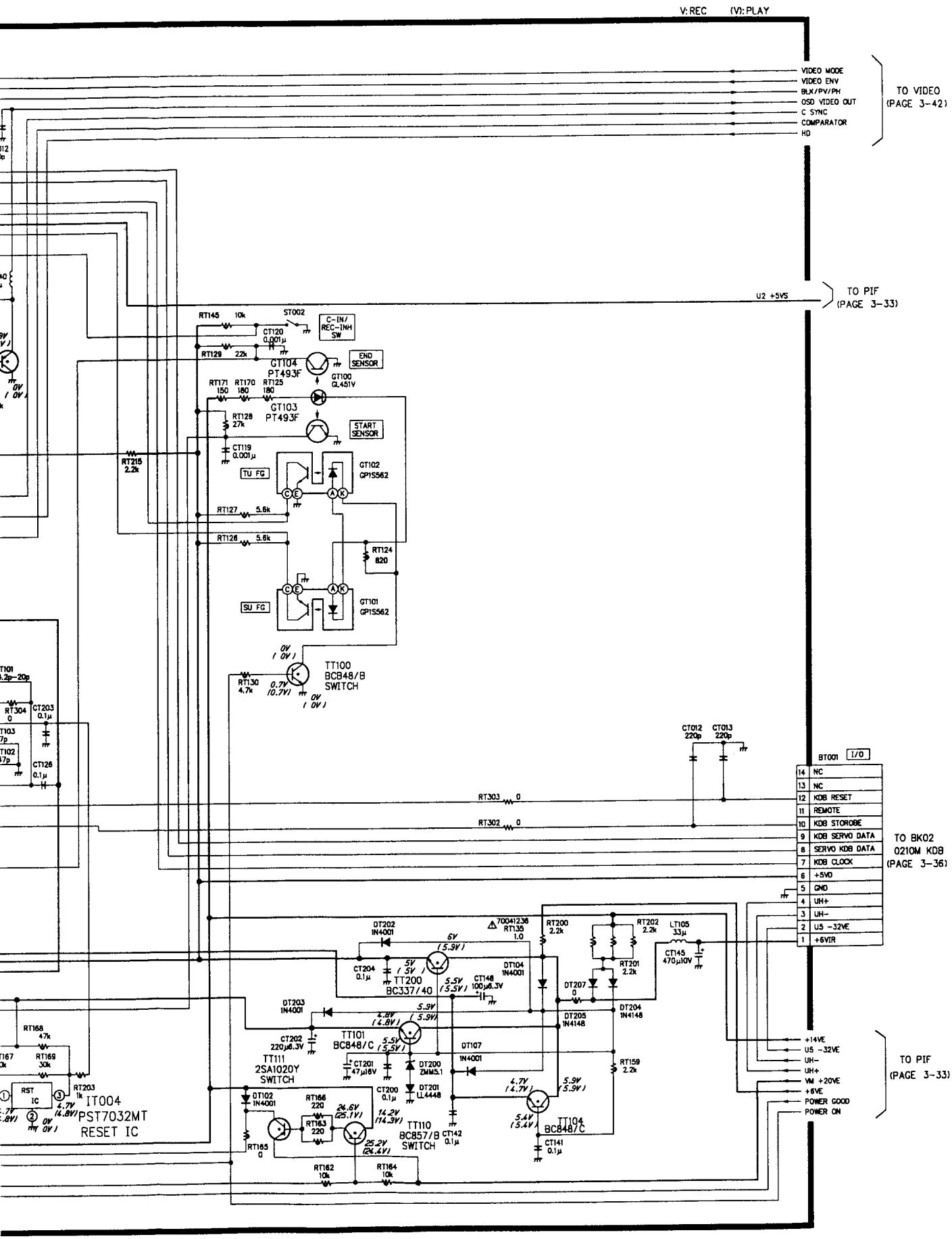
0005M MAIN(SERVO/LOGIC)



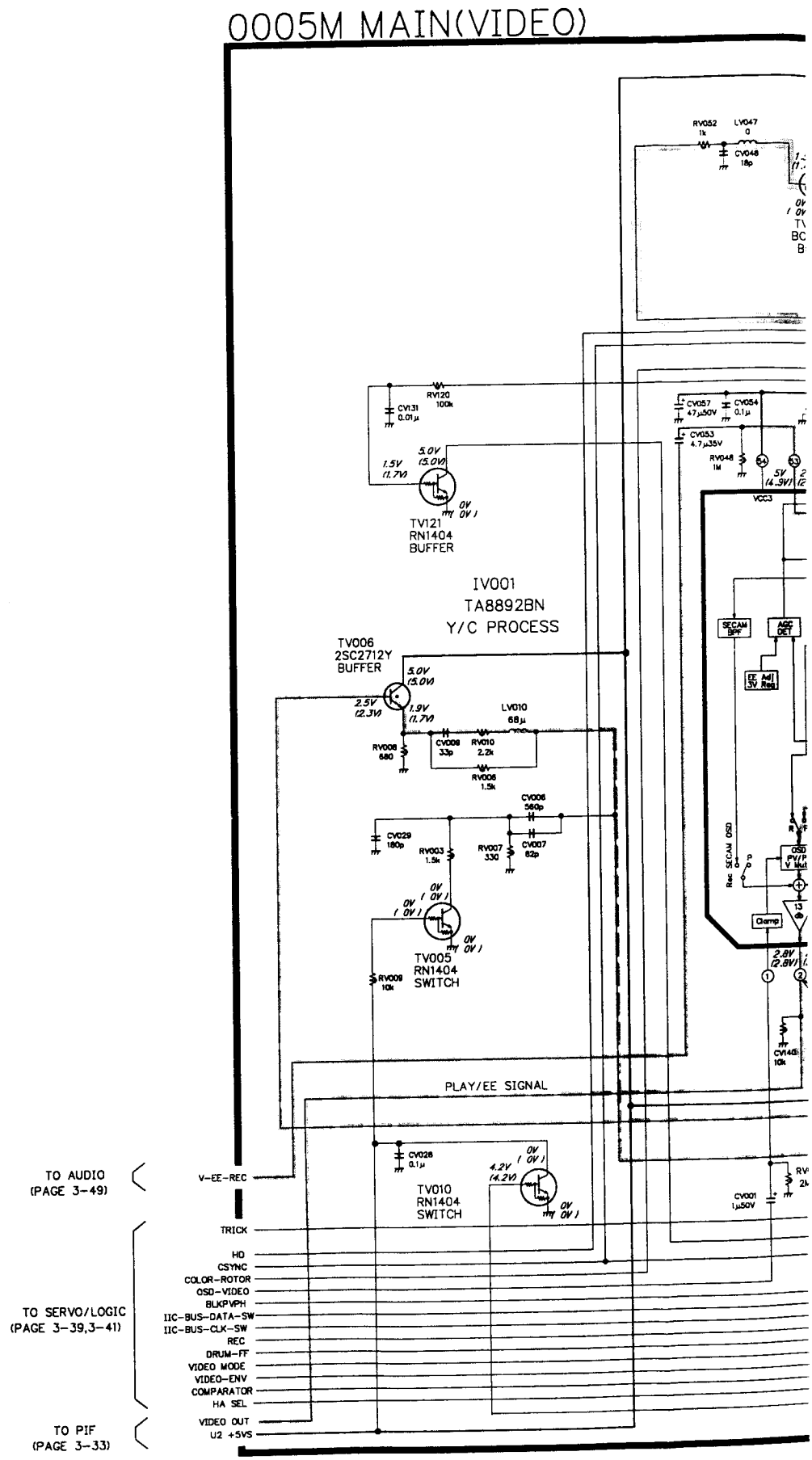
IC)


IT001
TMP90CS74DF-7824
MAIN MICROCOMPUTER
IT005
TB6515AP
CYLINDER DRIVER
TT106
RN1404
SWITCH
TT107
RN1404
SWITCH
TT109
RN1402
SWITCH
BT002
DRUM FF
BT003
CONTROL
PULSE
DRUM FF
MONITOR
SCL EV
SDA EV
TRICK
SCL SW
SDA SW
TU REEL
SU REEL
A.Vcc2
CAP LIMITER
KDB SERVO DATA
SERVO KDB DATA
KDB CLOCK
HA SEL
CR
VIDEO ENVE
VIDEO MODE
SCART1 IN
SCART2 IN
C.IN/REC INH
CAM C
CAM A/B
ADGND
ADREF
DVCC1
SP/LP/EP
AUDIO MUTE
ERASE CTL
REC MUTE(H)
REC(H)
PB ON
HARD ERROR
POWER ON
AGND1
CBIAS
R/P CTL
CBIAS IN
C.AMP0
C.AMP1
CNFB
C-POP
C-PDM
CFGA AMP
CFGA IN
CFG BIAS
CFGB IN
CFGB AMP
AVCC1
CTL OUT

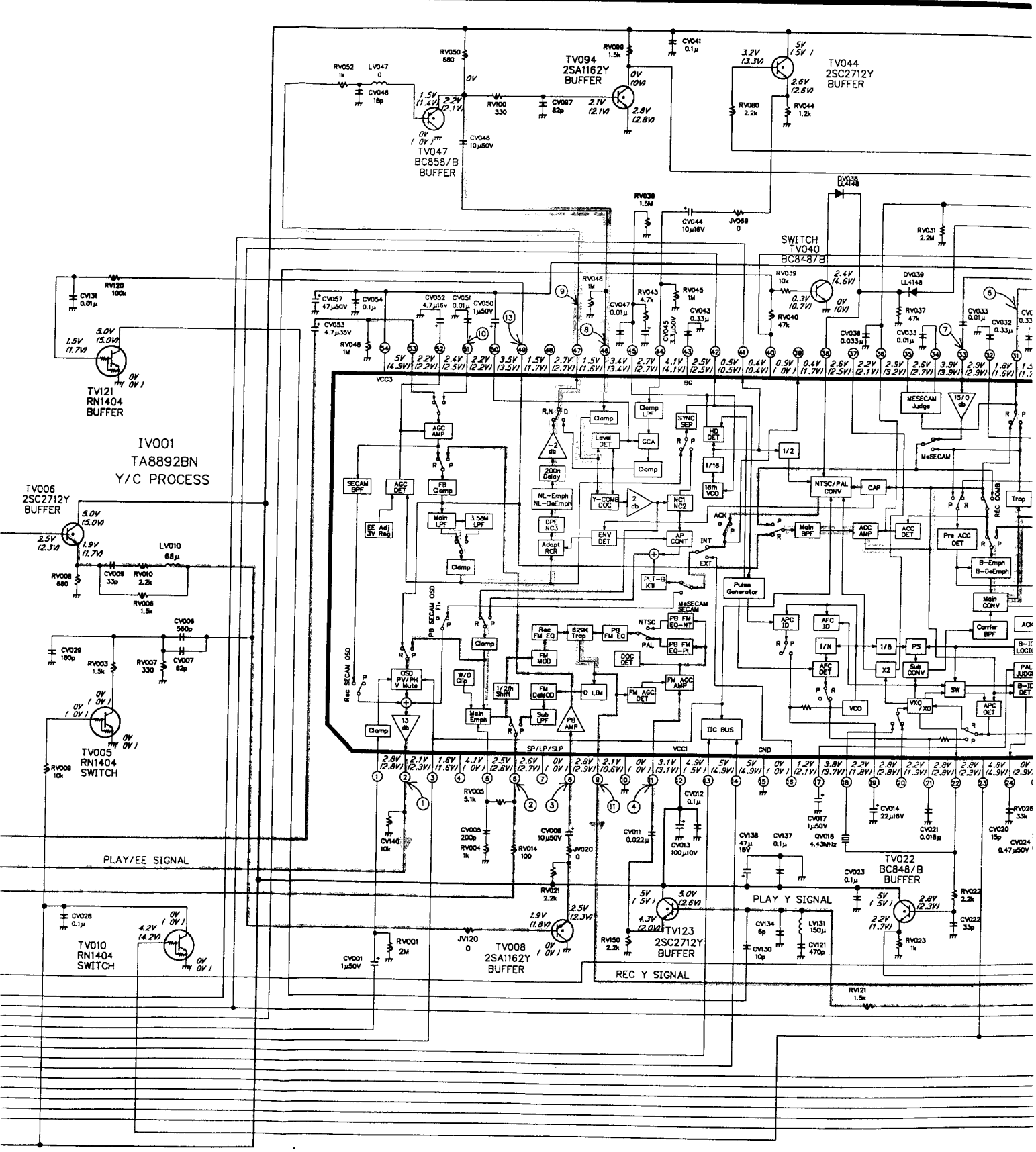

IT001
TMP90CS74DF-7824
MAIN MICROCOMPUTER
IT004
PST7032MT
RESET IC
TT102
BC858/B
AMP
TT100
BC848/B
SWITCH
TT101
BC848/C
TT111
2SA1020Y
SWITCH
TT110
BC857/B
SWITCH
TT200
BC337/40
GT104
PT493F
GT103
PT493F
GT102
GP1S562
GT101
GP1S562
GT100
GL451V
BT002
DRUM FF
BT003
CONTROL
PULSE
C-IN/
REC-INH
SW
END
SENSOR
START
SENSOR
TU FG
SU FG
NC
HA SEL
CR
DRUM FF
MONITOR
SCL EV
SDA EV
TRICK
SCL SW
SDA SW
TU REEL
SU REEL
A.Vcc2
FSC IN
4FSC FIL
BLK/PVI/PH
OSD
VIDEO
RXD1
AGND2
C.Sync IN
HD IN
COMP IN
DVCC2
CLK
TEST
X IN
X OUT
RESET
XTOUT
XTIN
DGND2
KDB RESET
KDB STROBE
CAP F/R
END SENS
START SENS
POWER GOOD
REMOTE
DFG
CTL OUT
AVCC1
CFGB AMP
CFGB IN
CFG BIAS
CFGA IN
CFGA AMP
C-PDM
C-POP
CNFB
C.AMP1
C.AMP0
CBIAS IN
R/P CTL
CBIAS

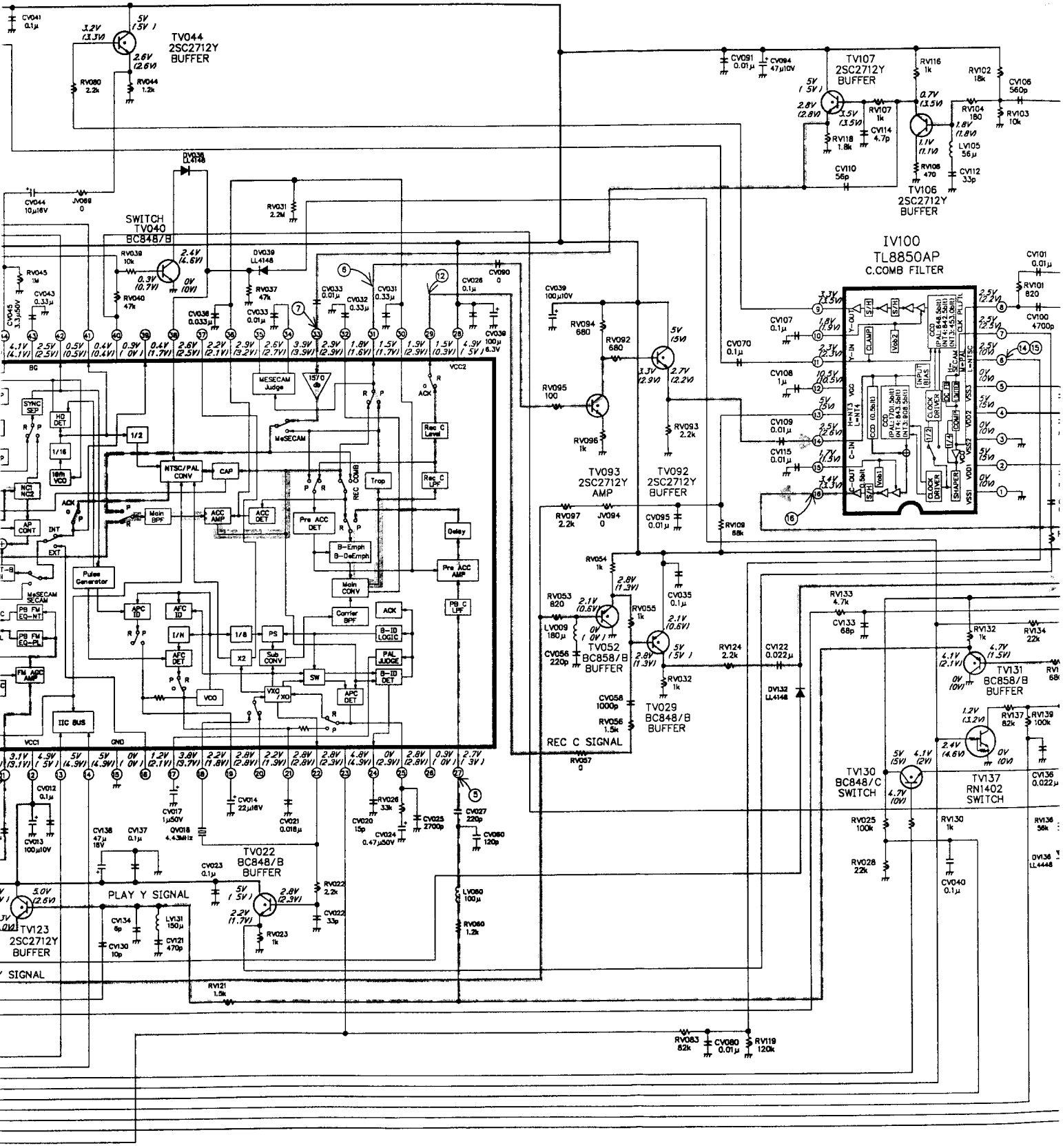

V: REC (V): PLAY
VIDEO MODE
VIDEO ENV
BLK/PV/PH
OSD VIDEO OUT
C SYNC
COMPARATOR
HD
TO VIDEO (PAGE 3-42)
U2 +5VS
TO PIF (PAGE 3-33)
C-IN/ REC-INH SW
END SENSOR
START SENSOR
TU FG
SU FG
GT104 PT493F
GT100 GL451V
GT103 PT493F
GT102 GP1S562
GT101 GP1S562
TT100 BC848/B SWITCH
TT200 BC337/40
TT101 BC848/C
TT111 2SA1020Y SWITCH
TT110 BC857/B SWITCH
TT104 BC848/C
IT004 PST7032MT RESET IC
BT001 I/O
14 NC
13 NC
12 KDB RESET
11 REMOTE
10 KDB STOROBE
9 KDB SERVO DATA
8 SERVO KDB DATA
7 KDB CLOCK
6 +5VD
5 GND
4 UH+
3 UH-
2 U5 -32VE
1 +6VIR
TO BK02 0210M KDB (PAGE 3-36)
+14VE
U5 -32VE
UH-
UH+
VM +20VE
+6VE
POWER GOOD
POWER ON
TO PIF (PAGE 3-33)

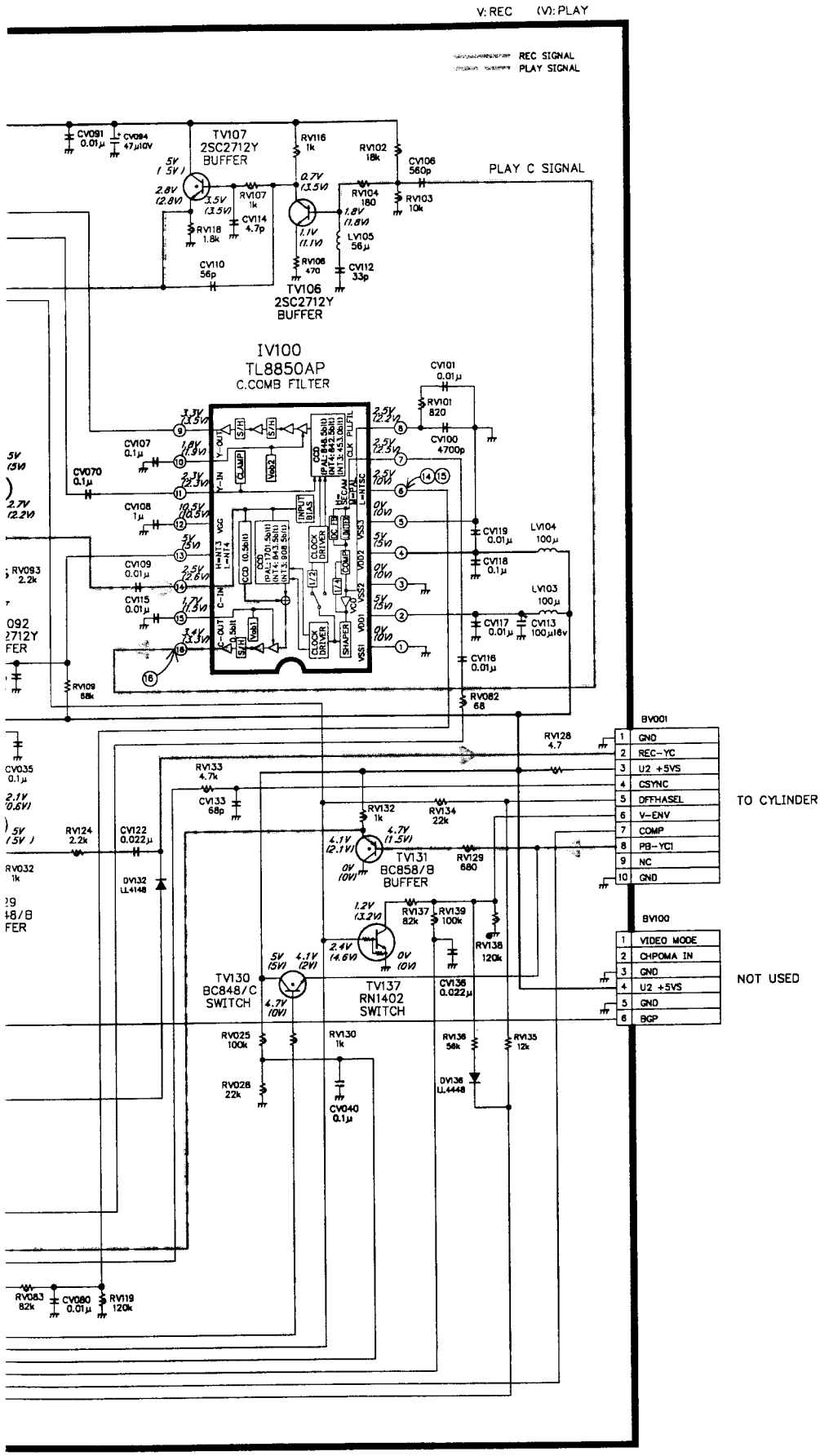
8-5. Video Circuit Diagram



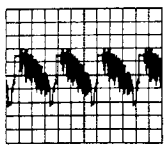
)5M MAIN(VIDEO)




TV044
2SC2712Y
BUFFER
SWITCH
TV040
BC848/B
TV107
2SC2712Y
BUFFER
TV106
2SC2712Y
BUFFER
IV100
TL8850AP
C.COMB FILTER
TV093
2SC2712Y
AMP
TV092
2SC2712Y
BUFFER
TV052
BC858/B
BUFFER
TV029
BC848/B
BUFFER
REC C SIGNAL
TV131
BC858/B
BUFFER
TV130
BC848/C
SWITCH
TV137
RN1402
SWITCH
TV022
BC848/B
BUFFER
PLAY Y SIGNAL
TV123
2SC2712Y
BUFFER
MESECAM
Judge
NTSC/PAL
CONV
CAP
Trap
Rec C
Level
Rec C
LPF
ACC
AMP
ACC
DET
Pre ACC
DET
Pre ACC
AMP
Delay
B-Emph
B-DeEmph
Main
CONV
Carrier
BPF
PB C
LPF
Pulse
Generator
APC
ID
AFC
ID
PS
Sub
CONV
SW
VCO
VXO
/XO
APC
DET
B-ID
LOGIC
PAL
JUDGE
B-ID
DET
IIC BUS
SYNC
SEP
HD
DET
AP
CONT
INT
EXT
ACK
VCC1
GND
VCC2

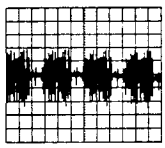

V: REC (V): PLAY
REC SIGNAL
PLAY SIGNAL
PLAY C SIGNAL
TV107
2SC2712Y
BUFFER
TV106
2SC2712Y
BUFFER
IV100
TL8850AP
C.COMB FILTER
TV131
BC858/8
BUFFER
TV130
BC848/C
SWITCH
TV137
RN1402
SWITCH
BV001
1 GND
2 REC-YC
3 U2 +5VS
4 CSYNC
5 DFFHASEL
6 V-ENV
7 COMP
8 PB-YC1
9 NC
10 GND
TO CYLINDER
BV100
1 VIDEO MODE
2 CHPOMA IN
3 GND
4 U2 +5VS
5 GND
6 BGP
NOT USED

① IV001, Pin ② F-6



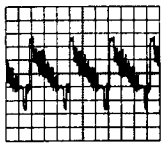
PLAY
V:500mV/div
H:20μs/div

⑦ IV001, Pin ㉝ C-9



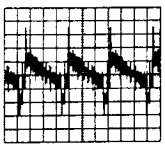
PLAY
V:100mV/div
H:20μs/div

⑬ IV001, Pin ㊾ C-6



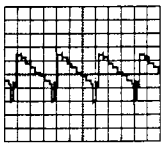
REC
V:100mV/div
H:20μs/div

② IV001, Pin ⑥ F-7



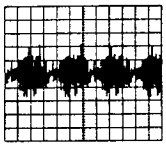
PLAY
V:100mV/div
H:20μs/div

⑧ IV001, Pin ㊻ C-7



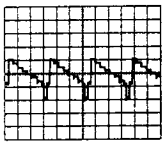
PLAY
V:100mV/div
H:20μs/div

⑭ IV100, Pin ⑥ C-13



PLAY
V:100mV/div
H:20μs/div

③ IV001, Pin ⑧ F-7

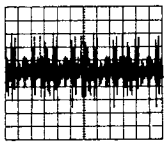


PLAY
V:100mV/div
H:20μs/div

⑨ IV001, Pin ㊼ C-7

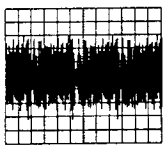
PLAY
V:200mV/div
H:20μs/div

⑮ IV100, Pin ⑥ C-13



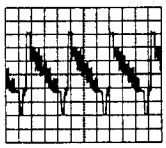
REC
V:100mV/div
H:20μs/div

④ IV001, Pin ⑪ F-7



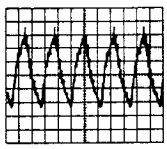
PLAY
V:75mV/div
H:20μs/div

⑩ IV001, Pin ㊶ C-6



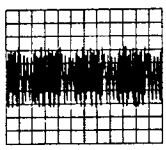
EE/REC
V:200mV/div
H:20μs/div

⑯ IV100, Pin ⑯ D-12



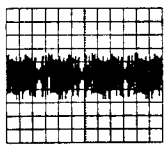
REC
V:50mV/div
H:0.1μs/div

⑤ IV001, Pin ㉗ F-10



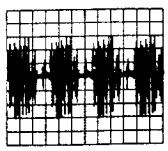
PLAY
V:50mV/div
H:20μs/div

⑪ IV001, Pin ⑨ F-7



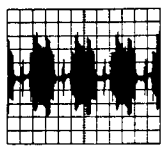
REC
V:200mV/div
H:20μs/div

⑥ IV001, Pin ㉛ C-9



PLAY
V:75mV/div
H:20μs/div

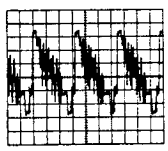
⑫ IV001, Pin ㉙ C-10



REC
V:50mV/div
H:20μs/div

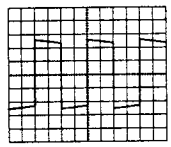
8-6. Terminal Circuit Diagram

① IX001, Pin ② E-8



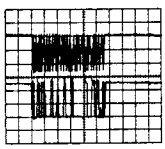
V:200mV/div
H:20μs/div

⑥ IY001, Pin ⑦ E-11



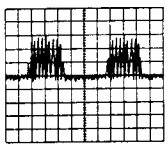
V:1V/div
H:10ms/div

② IX001
(a) Pin ⑪ (SCL) F-7
(b) Pin ⑨ (SDA) E-8



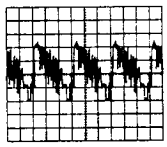
(a)
(b)
V:2V/div
H:200μs/div

⑦ IY001, Pin ⑨ E-10



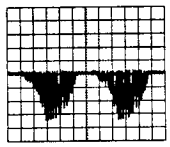
V:100mV/div
H:50ms/div

③ IX001, Pin ⑯ E-6



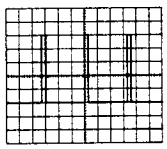
V:500mV/div
H:20μs/div

⑧ IY001, Pin ⑫ D-10



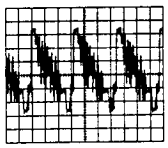
V:200mV/div
H:50ms/div

④ IY001, Pin ⑤ E-11



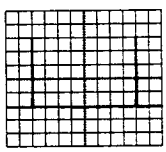
VCS
V:1V/div
H:20μs/div

⑨ IY001, Pin ⑬ D-10

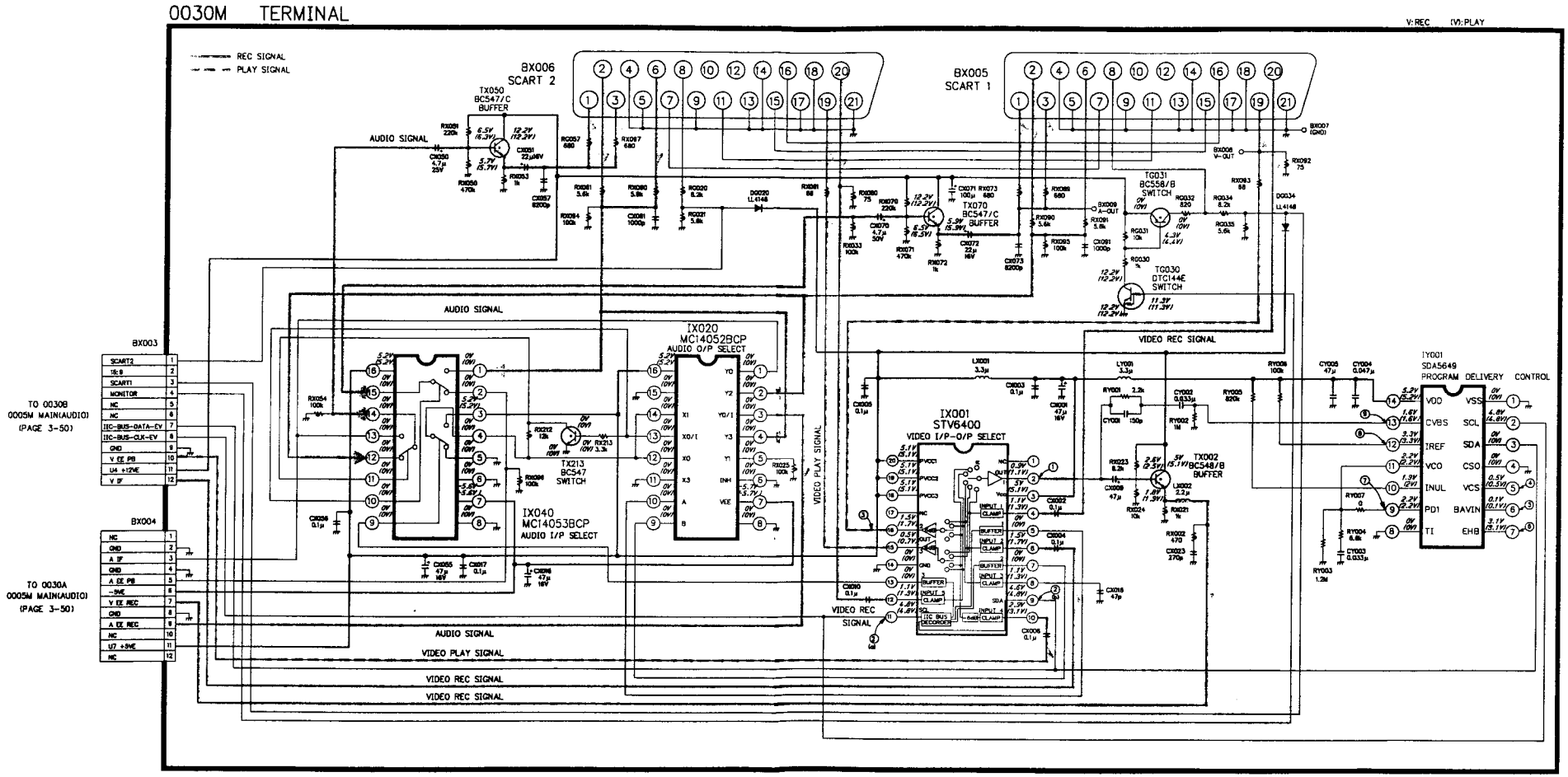


V:200mV/div
H:20μs/div

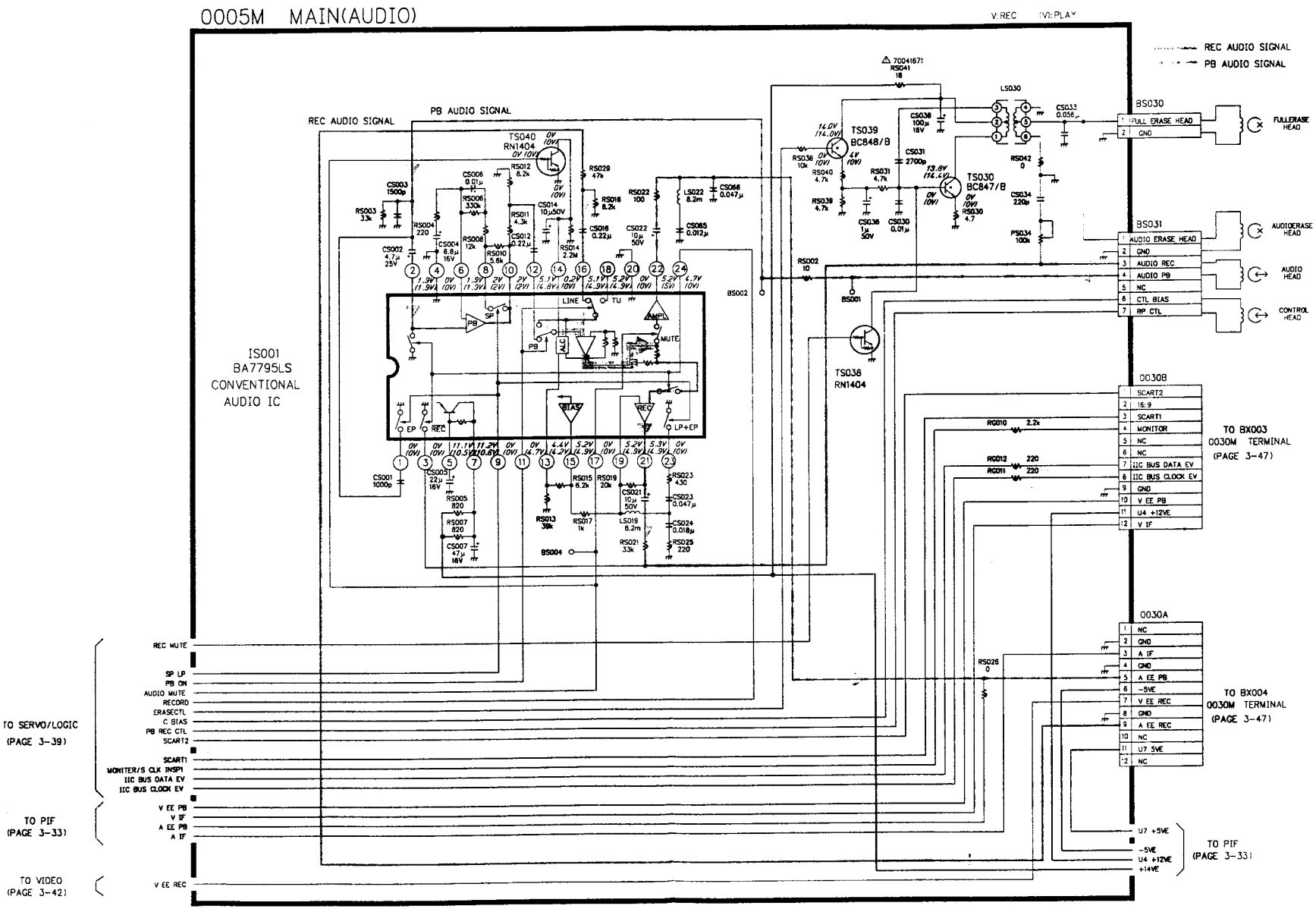
⑤ IY001, Pin ⑥ E-11



DAVIN
V:1V/div
H:5ms/div

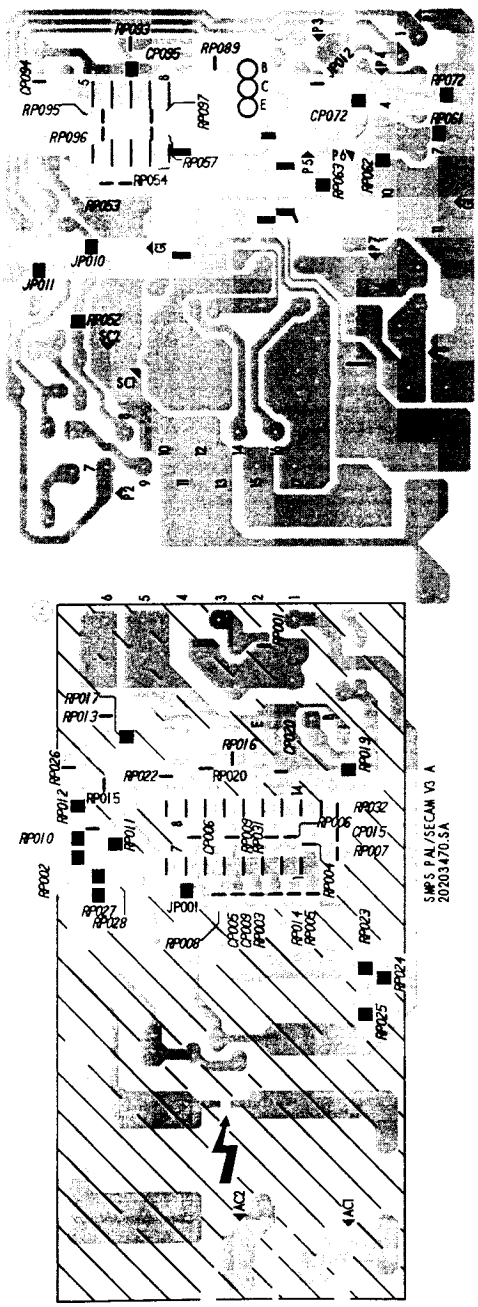

0030M TERMINAL
V:REC (V):PLAY
REC SIGNAL
PLAY SIGNAL
BX006 SCART 2
BX005 SCART 1
TX050 BC547/C BUFFER
TX070 BC547/C BUFFER
TG031 BC558/B SWITCH
TG030 DTC144E SWITCH
AUDIO SIGNAL
VIDEO REC SIGNAL
VIDEO PLAY SIGNAL
IX020 MC14052BCP AUDIO O/P SELECT
IX040 MC14053BCP AUDIO I/P SELECT
TX213 BC547 SWITCH
IX001 STV6400 VIDEO I/P-O/P SELECT
TX002 BC548/B BUFFER
IY001 SDA5649 PROGRAM DELIVERY CONTROL
BX003
BX004
TO 0030B 0005M MAIN(AUDIO) (PAGE 3-50)
TO 0030A 0005M MAIN(AUDIO) (PAGE 3-50)

8-7. Audio Circuit Diagram

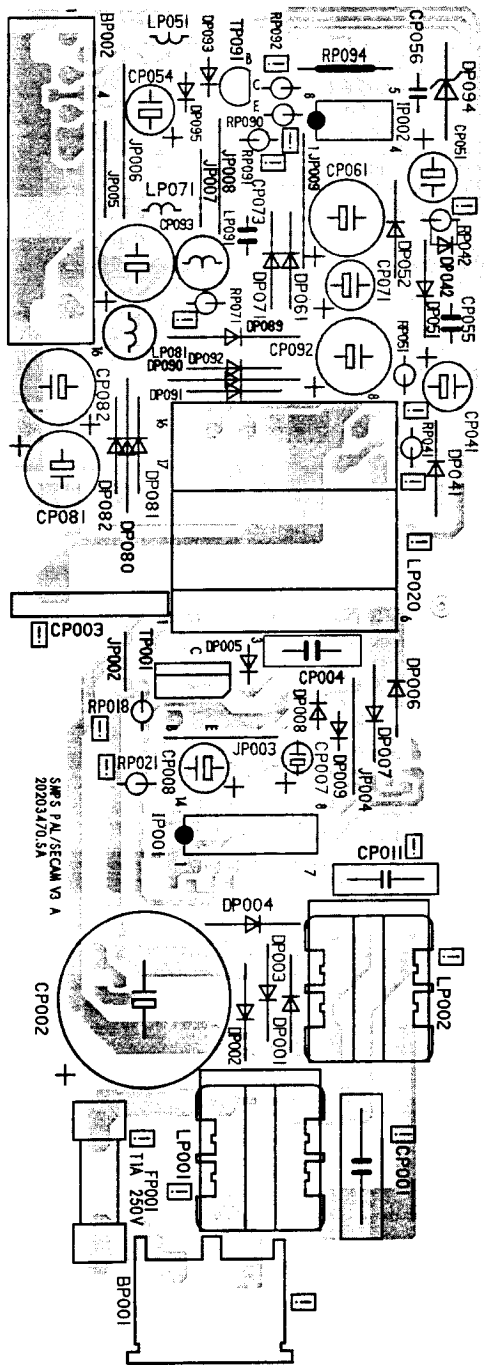


9. PC BOARDS

9-1. Power PC Board



0150M Power PC Board
(Bottom Side)

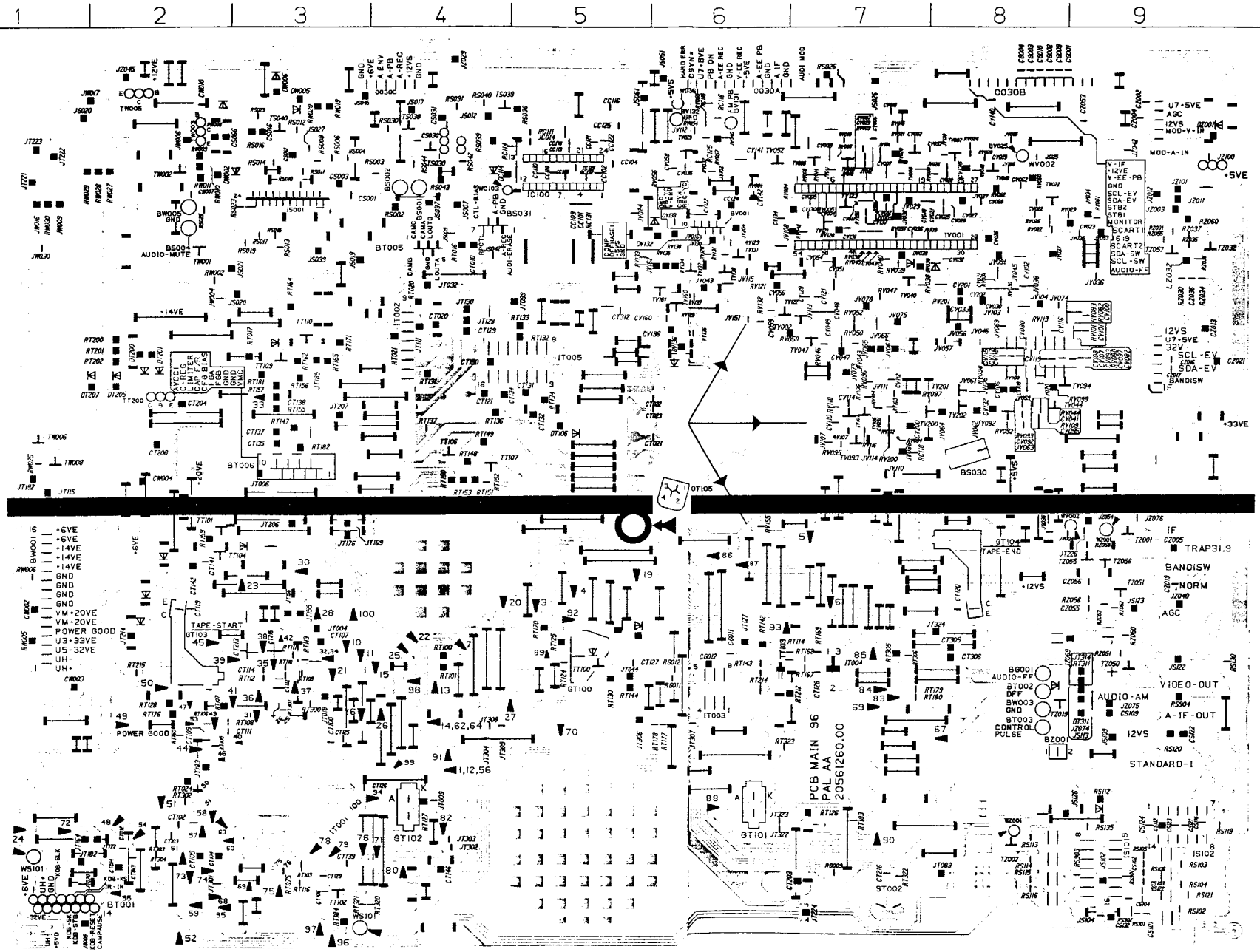


0150M Power PC Board
(Top Side)

SYMBOL NO.	LOCATION
DP041	C-4
DP051	B-4
DP052	B-4
DP061	B-4
DP071	B-4
DP080	C-3
DP090	B-3
DP093	A-3
DP094	A-4
DP095	A-3
IP001	D-3
IP002	A-4
TP091	A-3

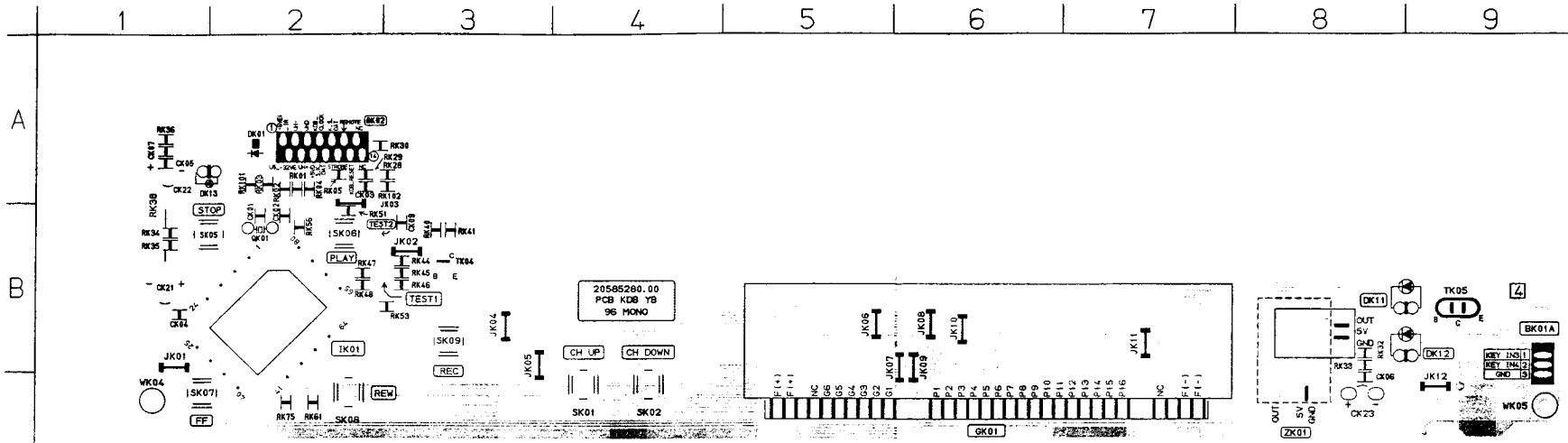
9-2. Main (PIF, Servo/Logic, Video, Audio) PC Board

SYMBOL NO.	LOCATION
DT200	C-2
DT201	C-2
DT207	C-2
DW002	A-2
DW005	A-3
DW006	A-3
DZ001	A-9
GT100	E-5
GT101	F-6
GT102	F-4
GT103	E-2
GT104	D-8
IS001	B-3
IT001	F-3
IT002	C-4
IT003	E-6
IT004	E-7
IT005	C-5
IV001	B-8
TS030	A-4
TS038	A-4
TS039	A-4
TS040	A-3
TT100	E-5
TT101	D-2
TT102	G-3
TT104	D-3
TT106	C-4
TT107	D-4
TT109	C-3
TT110	C-3
TV005	A-7
TV006	A-7
TV008	A-7
TV022	B-8
TV029	A-6
TV040	B-7
TV044	C-9
TV047	C-7
TV052	A-6
TV092	C-8
TV093	D-7
TV094	C-9
TV106	C-7
TV107	C-7
TV121	B-7
TV123	B-7
TV130	B-6
TV131	B-6
TW001	B-2
TW002	B-2
TW003	A-2
TW005	A-2
TW006	C-1
TW008	D-1
TZ032	B-9
TZ050	E-9
TZ051	E-9
TZ057	B-9



0005M Main (PIF, Servo/Logic, Video, Audio) PC Board

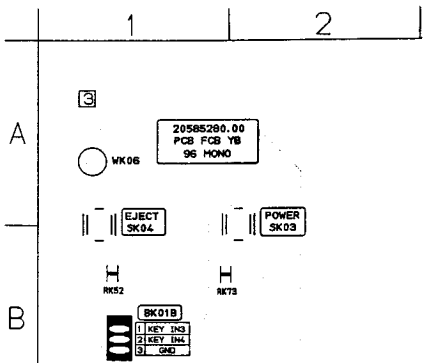
9-3. KDB PC Board



SYMBOL NO.	LOCATION
DK11	B-8
DK12	B-9
DK13	A-1
IK01	C-2
TK04	B-3
TK05	B-9

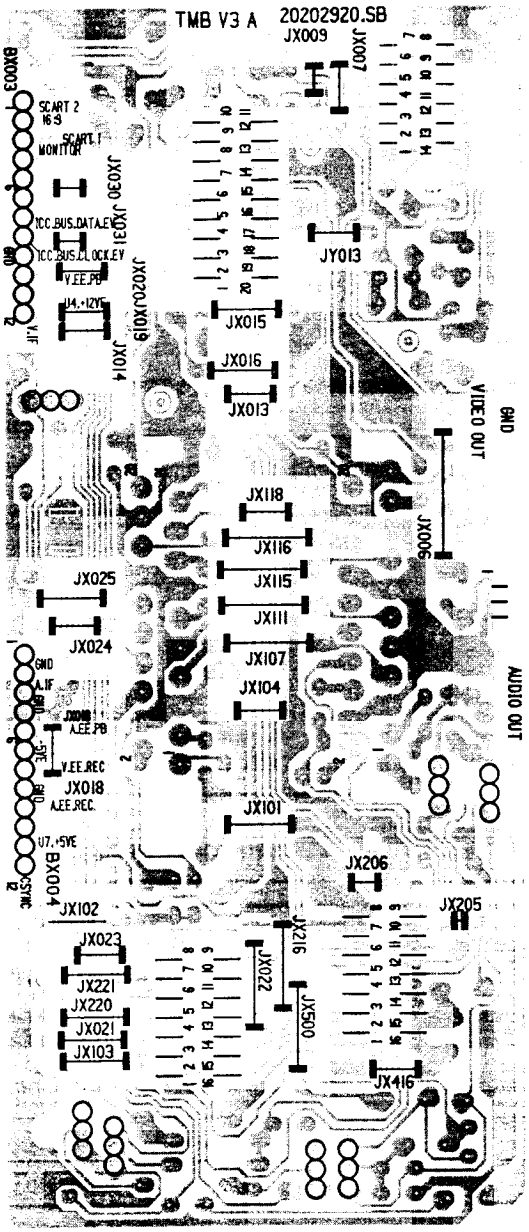
0210M KDB PC Board

9-4. FCB PC Board

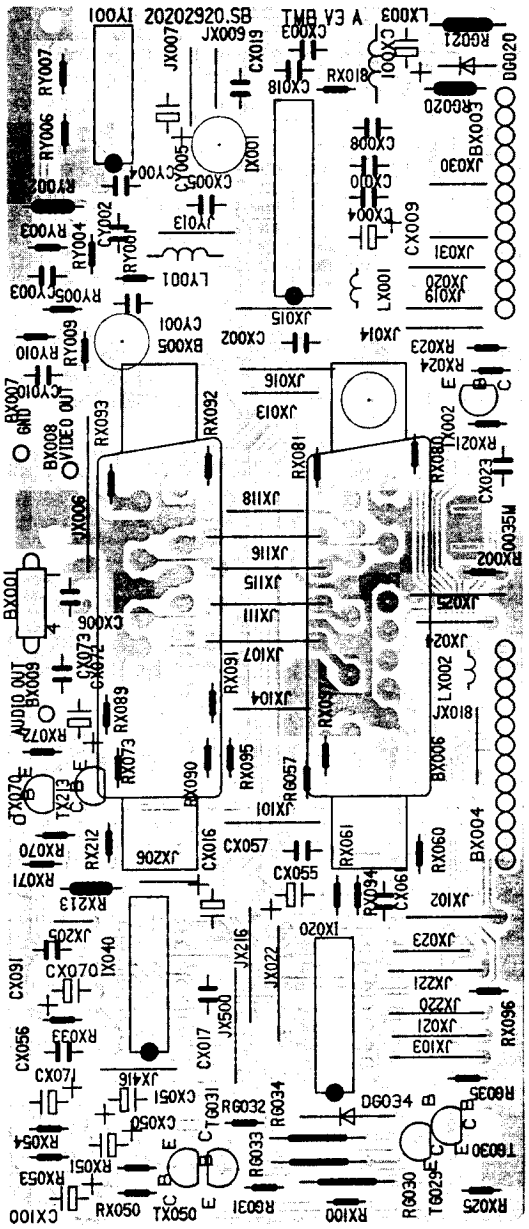


0212M FCB PC Board

9-5. Terminal PC Board



0030M Terminal PC Board (Bottom Side)



0030M Terminal PC Board (Top Side)

SYMBOL NO.	LOCATION	SYMBOL NO.	LOCATION
DG020	A-5	TG029	E-4
DG034	E-4	TG030	E-5
		TG031	E-4
IX001	A-4	TX002	B-5
IX020	D-4	TX050	E-4
IX040	D-3	TX070	D-3
IY001	A-3	TX213	D-3

SECTION 4
PARTS LIST

SAFETY PRECAUTION

The parts identified by ⚠ mark are critical for safety. Replace only with part number specified.

The mounting position of replacement is to be identical with originals.

The substitute replacement parts which do not have the same safety characteristics as specified in the parts list may create shock, fire or other hazards.

NOTICE

The part number must be used when ordering parts in order to assist in processing, be sure to include the model number and description.

Parts marked # are of chip type and mounted on original PC boards.

However, when they are placed for servicing works, use discrete parts listed on the parts list.

ABBREVIATIONS

1. **Integrated circuit (IC)**
2. **Capacitor (Cap)**
   - **Capacitance Tolerance (for Nominal Capacitance more than 10pF)**

Symbol	B	C	D	F	G	J	K	M	N
Tolerance %	± 0.1	± 0.25	± 0.5	± 1	± 2	± 5	± 10	± 20	± 30

Symbol	P	Q	T	U	V	W	X	Y	Z
Tolerance %	+ 100 0	+ 30 −10	+ 50 −10	+ 75 −10	+ 20 −10	+ 100 −10	+ 40 −20	+ 150 −10	+ 80 −20

Ex. 10μF J = 10μF ± 5%

   - **Capacitance Tolerance (for Nominal Capacitance 10pF or less)**

Symbol	B	C	D	F	G
Tolerance pF	± 0.1	± 0.25	± 0.5	± 1	± 2

Ex. 10pF G = 10pF ± 2pF

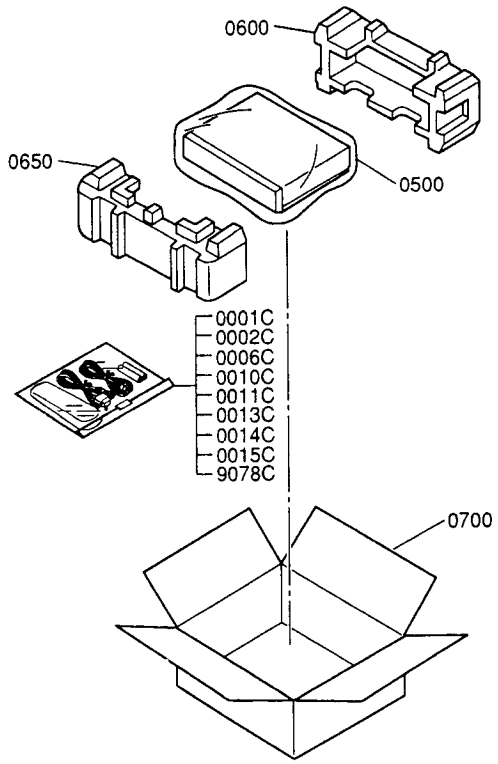
3. **Resistor (Res)**
   - **Resistance tolerance**

Symbol	B	C	D	F	G	J	K	M
Tolerance %	± 0.1	± 0.25	± 0.5	± 1	± 2	± 5	± 10	± 20

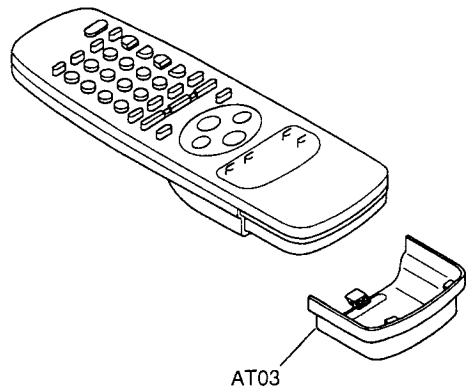
Ex. 470 Ω J = 470Ω ± 5%

4. EXPLODED VIEWS

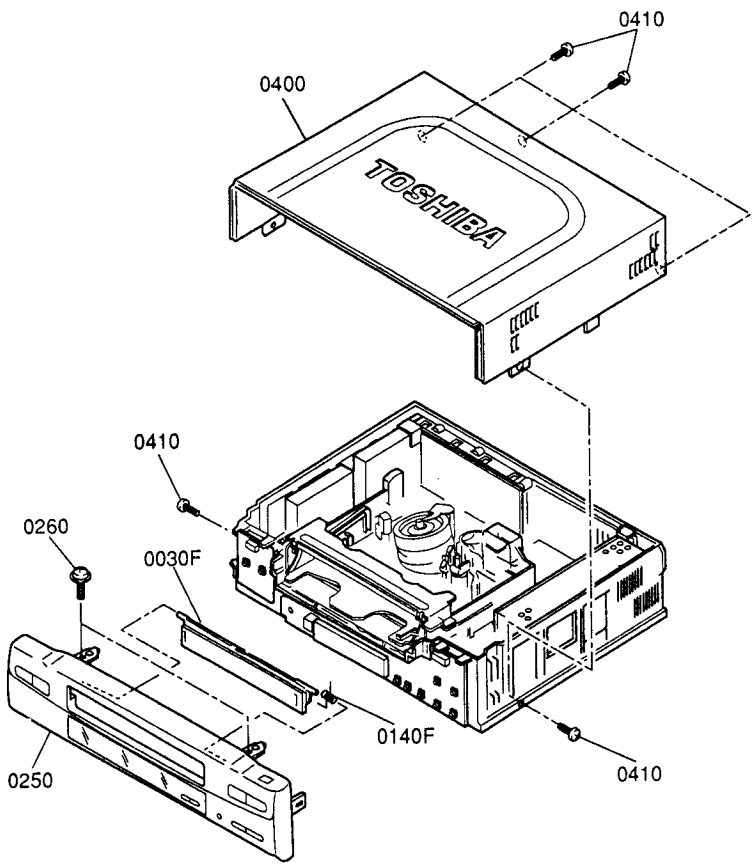
4-1. Packing Assembly



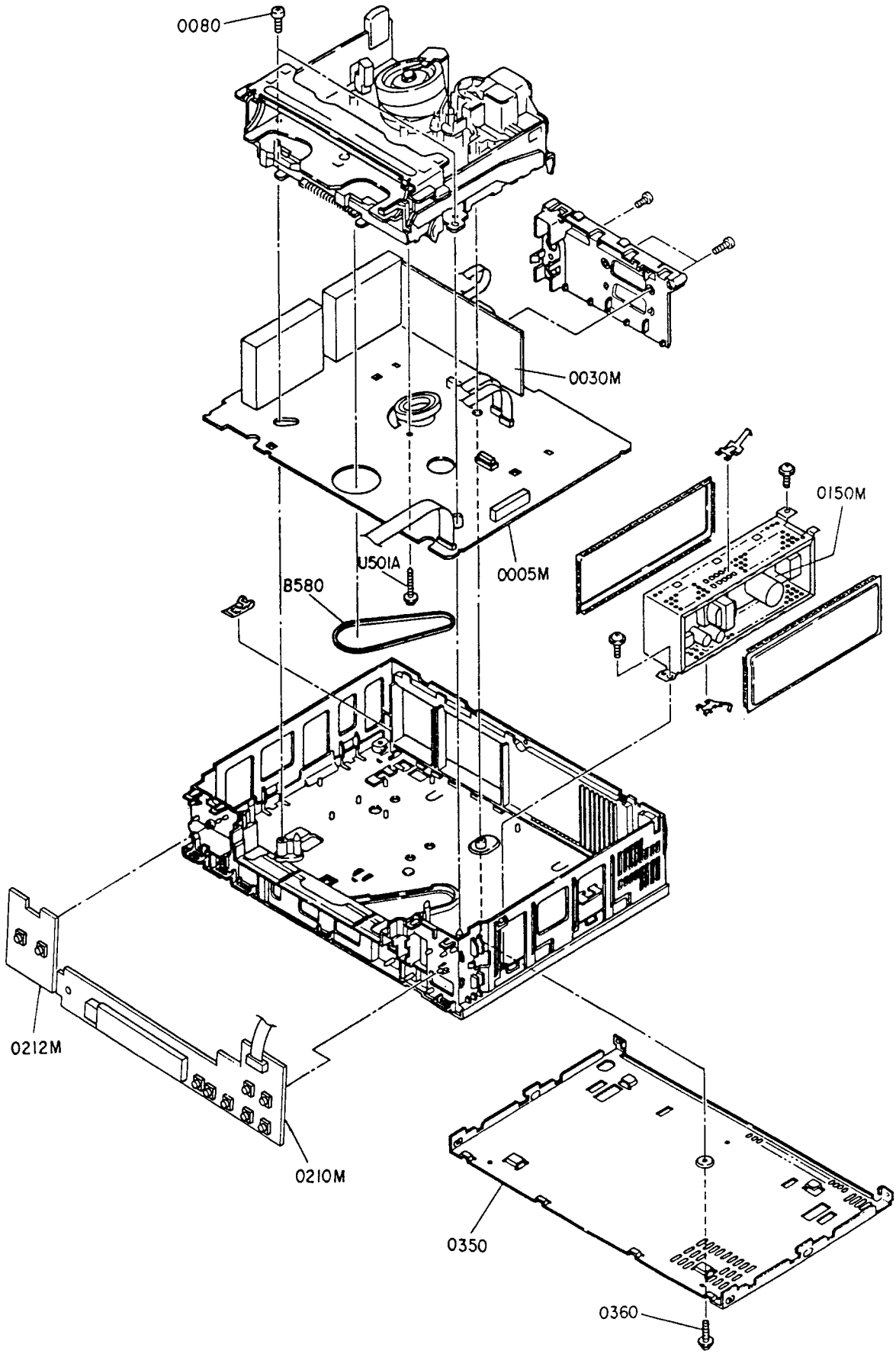
4-2. Remote Control Unit



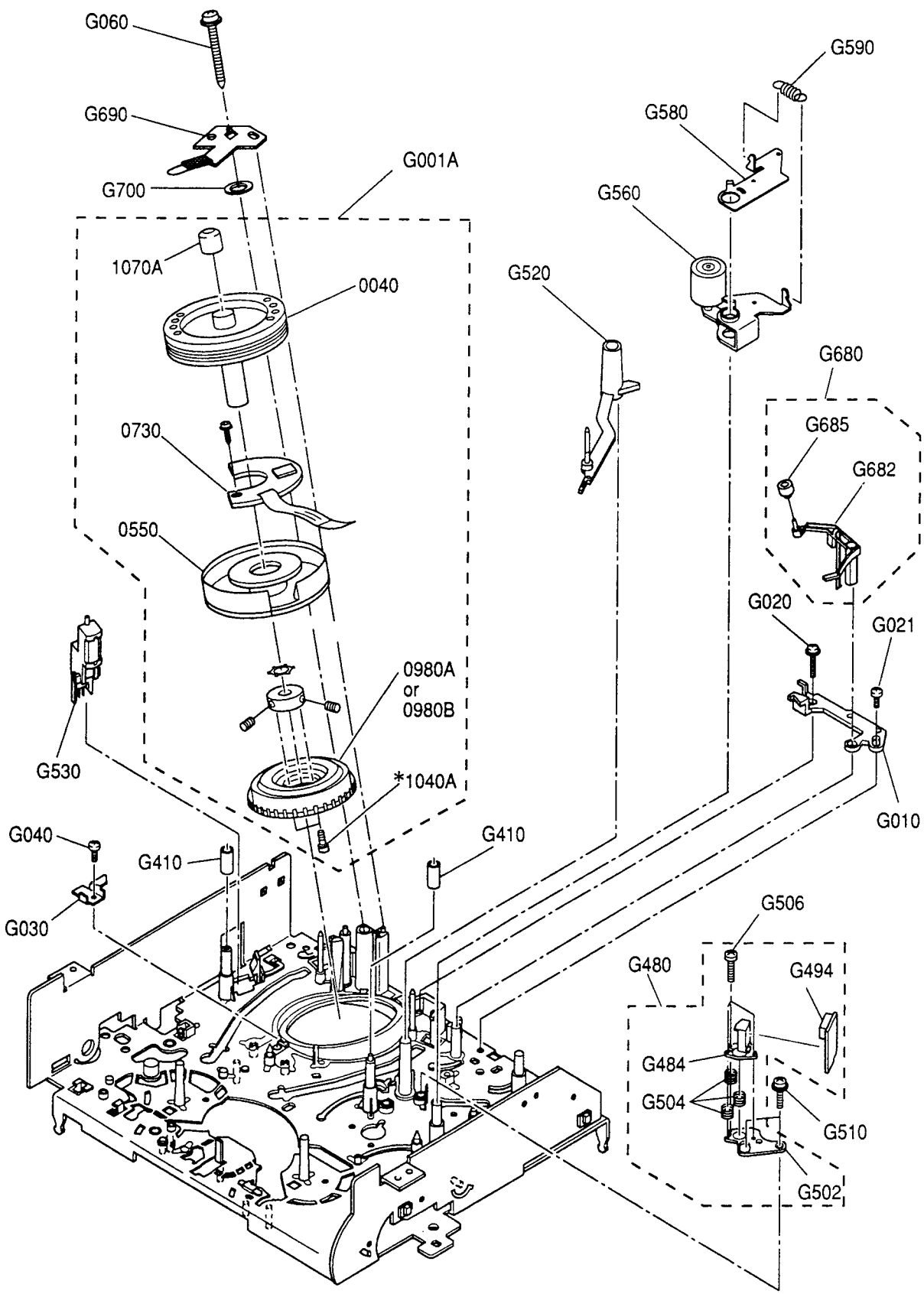
4-3. Cabinet Assembly



4-4. Chassis Assembly

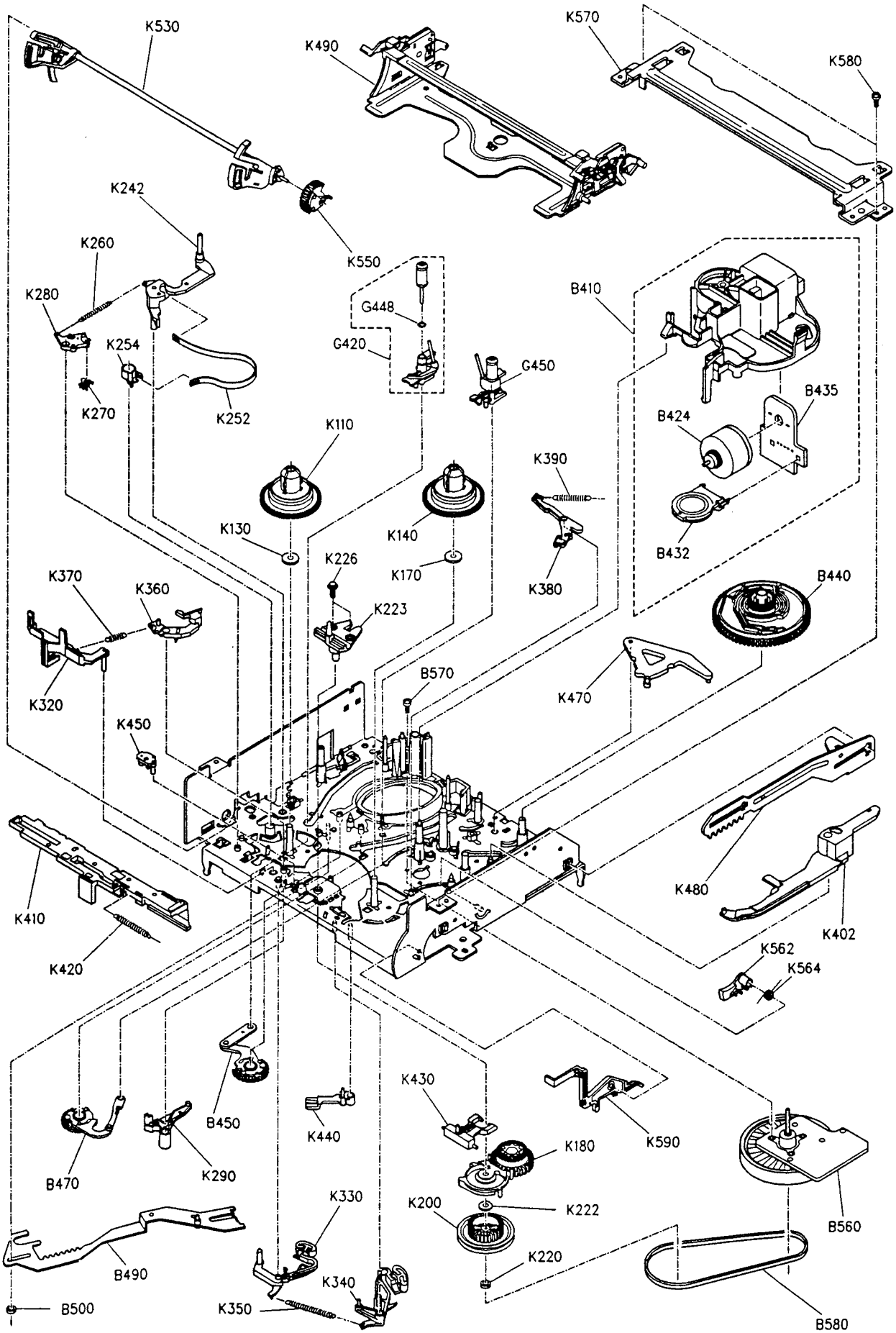


4-5. Mechanism Assembly (1)



*:1040A is used only for
the screw securing type rotor.

4-6. Mechanism Assembly (2)



5. PARTS LIST

LOCATION NUMBER	PART NUMBER	DESCRIPTION
		- MECHANICAL PARTS -
⚠0001C	70061686	Owners Manual English
0010C	70012584	Remote Control Unit
0013C	70011442	Cable
⚠0014C	70012604	Power Cord
0030F	70051832	Cassette Door
0040	70903992	Upper Cylinder Assy
0140F	70051372	Spring
⚠0250	70051827	Front Panel
0350	70051141	Bottom Plate
⚠0400	70051620	Top Cover
0550	70031714	Lower Cylinder Assy
0600	70061499	Packing(Front)
0650	70061500	Packing(Rear)
0700	70917888	Case
0980A	70031561	Rotor(Screw Securing Type)
0980B	70031620	Rotor(Press Fit Securing Type)
1040A	70031567	Screw
1070A	70031559	Ground Cap
AT03	70107025	Case(Battery)
B410	70031394	Loading Drive Assy
B424	70031396	Loading Motor Sub Assy
B432	70031401	Cam Switch
B435	70031402	Loading Drive Unit
B440	70051147	Cam Gear
B450	70031404	S Loading Assy
B470	70031408	T Loading Assy
B490	70031412	Loading Slider Assy
B560	70031744	Capstan Motor Assy
B570	70070028	Screw, 2.6x6mm
B580	70031442	Reel Belt
G001A	70031542	Cylinder Assy
G010	70031444	Plate(Cylinder)
G020	70031643	Screw 2.6x5mm
G021	70031644	Screw 2.6x5mm
G030	70031445	Plate(Cylinder)
G040	70031644	Screw 2.6x5mm
G060	70031449	Screw
G410	70031348	Guide Sleeve
G420	70031349	S Slider Assy
G448	70031505	O Ring
G450	70031360	T Slider Assy
G480	70031512	ACE Head Assy
G484	70031511	ACE Sub Base Assy
G504	70031508	Spring
G520	70031370	No.9 Guide Lever Assy
G530	70031443	FE Head
G560	70031384	Pinch Lever Assy
G580	70031390	Pinch Drive Assy
G590	70031392	Spring
G680	70031493	Cleaner Lever Assy
G690	70031540	Ground Brush
K110	70031328	S Reel Assy
K130	70031334	Washer
K140	70031335	T Reel Assy
K170	70031334	Washer
K180	70031339	Idle Arm Assy
K200	70031345	Center Gear Pully
K220	70031503	Washer
K222	70031527	Washer
K223	70031454	Center Post Assy
K242	70031374	Tension Lever Sub Assy
K252	70031376	Band Brake Sub Assy
K254	70031377	Band Holder
K260	70031660	Spring
K270	70031379	Hook Lever
K280	70031380	Hook Lever
K290	70031381	Tension Drive Lever
K320	70031466	Rec Inhibit Lever
K330	70031420	S Main Brake Assy
K340	70031421	T Main Brake Assy
K350	70031422	Spring
K360	70031469	S Soft Brake Lever
K370	70031423	Spring
K380	70031424	T Soft Brake Assy
K390	70031426	Spring
K402	70031471	Drive Lever
K410	70031427	Cam Slider
K420	70031428	Spring
K430	70031472	Idle Up Down Lever
K440	70031473	Idle Kick Lever
K450	70031476	Idle Centering Lever
K470	70031477	Cam Lever
K480	70031430	FL Drive Slider
K490	70031431	Cassette Holder Assy
K530	70031415	Drive Arm Assy
K550	70051150	Drive Lever Gear
K562	70031482	Arm Brake Lever
K564	70031440	Spring
K570	70031441	Top Bracket
K590	70031483	Door Open Lever
U501A	70070070	Screw

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
		- ELECTRICAL PARTS -	
0100	70095063	Main Assy	
■0005M		P C Board Assy	Main
		- INTEGRATED CIRCUITS -	
IS001	70011973	IC	BA7795LS
IT001	70012656	IC	TMP90CS74DF-7824
IT002	70011888	IC	TA7291S
IT003	70011892	IC	ST24C04
IT004	70011808	IC	PST7032MT
IT005	70011887	IC	TB6515AP
IV001	70012632	IC	TA8892BN
IV100	70012633	IC	TL8850AP
		- TRANSISTORS -	
GT103	70010181	Transistor, Photo	PT493F
GT104	70010181	Transistor, Photo	PT493F
TS030	70010331	Transistor	BC847B
TS038	A6004040	Transistor, Chip	RN1404
TS039	70010150	Transistor	BC848B
TS040	A6004040	Transistor, Chip	RN1404
TT100	70010150	Transistor	BC848B
TT101	70010942	Transistor	BC848
TT102	70010947	Transistor	BC858
TT104	70010942	Transistor	BC848
TT106	A6004040	Transistor, Chip	RN1404
TT107	A6004040	Transistor, Chip	RN1404
TT109	A6004020	Transistor, Chip	RN1402
TT110	70010332	Transistor	BC857B
TT111	70011386	Transistor	2SA1020-Y
TT200	70010131	Transistor	BC337-40
TV005	A6004020	Transistor, Chip	RN1402
TV006	A6335470	Transistor, Chip	2SC2712-Y
TV008	A6541130	Transistor, Chip	2SA1162-Y
TV010	A6004040	Transistor, Chip	RN1404
TV022	70010150	Transistor	BC848B
TV029	70010150	Transistor	BC848B
TV040	70010150	Transistor	BC848B
TV044	A6335470	Transistor, Chip	2SC2712-Y
TV047	70010947	Transistor	BC858
TV052	70010947	Transistor	BC858
TV092	A6335470	Transistor, Chip	2SC2712-Y
TV093	A6335470	Transistor, Chip	2SC2712-Y
TV094	A6541130	Transistor, Chip	2SA1162-Y
TV106	A6335470	Transistor, Chip	2SC2712-Y
TV107	A6335470	Transistor, Chip	2SC2712-Y
TV121	A6004040	Transistor, Chip	RN1404
TV123	A6335470	Transistor, Chip	2SC2712-Y
TV130	70010942	Transistor	BC848
TV131	70010947	Transistor	BC858
TV137	A6004020	Transistor, Chip	RN1402
TW001	70010942	Transistor	BC848
TW002	A6014030	Transistor, Chip	RN2403
TW003	A6325549	Transistor	2SC2236-Y
TW005	A6325549	Transistor	2SC2236-Y
TW006	70010947	Transistor	BC858
TW008	A6004050	Transistor, Chip	RN1405
TZ032	70010947	Transistor	BC858
TZ050	70010150	Transistor	BC848B
TZ051	70010947	Transistor	BC858
TZ057	70010947	Transistor	BC858
TZ060	70010131	Transistor	BC337-40
		- DIODES -	
DT102	70012342	Diode	1N4001
DT103	70012342	Diode	1N4001
DT104	70012342	Diode	1N4001
DT107	70012342	Diode	1N4001
DT108	70012342	Diode	1N4001
DT200	70011968	Diode, Zener	ZMM5.1
DT201	70010965	Diode	LL4448
DT202	70012342	Diode	1N4001
DT203	70012342	Diode	1N4001
DT204	70010153	Diode	1N4148
DT205	70010342	Diode, Chip	LL4148

LOCATION NUMBER	PART NUMBER	DESCRIPTION	
DT311	70010342	Diode, Chip	LL4148
DV038	70010342	Diode, Chip	LL4148
DV039	70010342	Diode, Chip	LL4148
DV132	70010342	Diode, Chip	LL4148
DV136	70010965	Diode	LL4448
DW001	70011967	Diode, Zener	ZPD12
DW002	70010965	Diode	LL4448
DW005	70011968	Diode, Zener	ZMM5.1
DW006	70010965	Diode	LL4448
DW007	70012342	Diode	1N4001
DW008	70012342	Diode	1N4001
DZ001	70012631	Diode, Zener	ZMM5.6
GT100	70010180	Diode, LED	GL451V
		- COILS -	
LS019	23237729	Coil, Peaking	TRF4822AP
LS022	23237729	Coil, Peaking	TRF4822AP
LS030	70011369	Transformer	
LT103	23238710	Coil, Peaking	TRF4220AJ
LT105	70010920	Coil, Peaking	
LT106	70011953	Coil, Peaking	
LV009	23289181	Coil, Peaking	TRF4181AF
LV010	70012096	Coil, Peaking	
LV060	70012095	Coil, Peaking	
LV103	23289101	Coil, Peaking	TRF4101AF
LV104	23289101	Coil, Peaking	TRF4101AF
LV105	23238705	Coil, Peaking	TRF4560AJ
LV131	70012628	Coil, Peaking	
LZ002	70012629	Coil, Peaking	
LZ051	70010924	Coil, Peaking	
		- CAPACITORS -	
CG011	70041873	Cap, Chip	100pF K
CG012	70041868	Cap, Chip	100pF K 50V
CS001	70041916	Cap, Chip	1.5nF K 50V
CS002	70040738	Cap, Electrolytic	4.7μF 25V
CS003	70041155	Cap, Chip	1.5nF J 50V
CS004	70041869	Cap, Electrolytic	6.8μF M 16V
CS005	24633220	Cap, Electrolytic	22μF M 16V
CS006	24591103	Cap, Plastic	0.01μF J 50V
CS007	70040415	Cap, Electrolytic	47μF M 16V
CS012	70041009	Cap, Chip	220nF Z 50V
CS014	24797100	Cap, Electrolytic	10μF M 50V
CS016	70041009	Cap, Chip	220nF Z 50V
CS021	24797100	Cap, Electrolytic	10μF M 50V
CS022	24797100	Cap, Electrolytic	10μF M 50V
CS023	24591473	Cap, Plastic	0.047μF J 50V
CS024	70041632	Cap, Plastic	180nF J 50V
CS030	70041596	Cap, Chip	10nF K 50V
CS031	70041490	Cap, Chip	2.7nF M 50V
CS033	70040053	Cap, Plastic	56nF J 63V
CS034	24214221	Cap, Ceramic	220pF K 500V
CS036	24636010	Cap, Electrolytic	1μF M 50V
CS038	24794101	Cap, Electrolytic	100μF M 16V
CS065	70041411	Cap, Plastic	12nF J 63V
CS066	70041625	Cap, Chip	47nF M 25V
CS119	70040738	Cap, Electrolytic	4.7μF 25V
CT010	24285222	Cap, Chip	2200pF K 50V
CT011	70041037	Cap, Electrolytic	47μF M 16V
CT012	70041118	Cap, Chip	220pF J 50V
CT013	70041118	Cap, Chip	220pF J 50V
CT020	70040730	Cap, Chip	100nF M 25V
CT021	70041596	Cap, Chip	10nF K 50V
CT022	70041596	Cap, Chip	10nF K 50V
CT023	70041596	Cap, Chip	10nF K 50V
CT100	70041328	Cap, Chip	100nF Z 25V
CT102	24774470	Cap, Chip	47pF J 50V
CT103	24774470	Cap, Chip	47pF J 50V
CT104	70041929	Cap, Chip	3.3pF C 50V
CT108	70041037	Cap, Electrolytic	47μF M 16V
CT109	24774101	Cap, Chip	100pF J 50V
CT110	70041037	Cap, Electrolytic	47μF M 16V
CT111	24774101	Cap, Chip	100pF J 50V
CT112	70040245	Cap, Ceramic, Chip	150pF J 50V
CT116	70041054	Cap, Electrolytic	1μF M 50V
CT117	70041054	Cap, Electrolytic	1μF M 50V
CT119	70040247	Cap, Ceramic, Chip	1nF J 50V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
CT120	70040247	Cap, Ceramic, Chip	1nF	J 50V
CT121	70040730	Cap, Chip	100nF	M 25V
CT123	24783130	Cap, Chip	13pF	J 50V
CT125	70041328	Cap, Chip	100nF	Z 25V
CT126	70041328	Cap, Chip	100nF	Z 25V
CT128	70041596	Cap, Chip	10nF	K 50V
CT129	70040730	Cap, Chip	100nF	M 25V
CT131	70040989	Cap, Chip	10nF	K 50V
CT132	70040989	Cap, Chip	10nF	K 50V
CT133	70041713	Cap, Electrolytic	100μF	M 16V
CT134	70040730	Cap, Chip	100nF	M 25V
CT135	70040989	Cap, Chip	10nF	K 50V
CT137	24285102	Cap, Chip	1000pF	K 50V
CT138	24285102	Cap, Chip	1000pF	K 50V
CT139	24774070	Cap, Chip	7pF	D 50V
CT141	70041328	Cap, Chip	100nF	Z 25V
CT142	70040730	Cap, Chip	100nF	M 25V
CT145	70041111	Cap, Electrolytic	470μF	M 10V
CT146	70041023	Cap, Chip	22nF	M 50V
CT148	70041292	Cap, Electrolytic	100μF	M 6.3V
CT200	70040730	Cap, Chip	100nF	M 25V
CT201	24203470	Cap, Electrolytic	47μF	M 16V
CT202	70011764	Cap, Electrolytic	220μF	M 6.3V
CT203	70040730	Cap, Chip	100nF	M 25V
CT204	70040730	Cap, Chip	100nF	M 25V
CT213	70041328	Cap, Chip	100nF	Z 25V
CT215	70041328	Cap, Chip	100nF	Z 25V
CT305	70040980	Cap, Chip	100pF	J 50V
CT306	70040980	Cap, Chip	100pF	J 50V
CT311	70042256	Cap, Electrolytic	3300μF	M 6.3V
CT312	70041653	Cap, Ceramic	470pF	J 50V
CV001	70041298	Cap, Electrolytic	1μF	M 50V
CV005	70041871	Cap, Chip	200pF	J 50V
CV006	70041651	Cap, Chip	560pF	J 50V
CV007	24774820	Cap, Chip	82pF	J 50V
CV008	70041641	Cap, Electrolytic	10μF	M 50V
CV009	24774330	Cap, Chip	33pF	J 50V
CV011	70041141	Cap, Chip	22nF	M 25V
CV012	70041699	Cap, Chip	100nF	K
CV013	70041570	Cap, Electrolytic	100μF	M 10V
CV014	70042153	Cap, Electrolytic	22μF	M 16V
CV017	70041298	Cap, Electrolytic	1μF	M 50V
CV020	70040238	Cap, Ceramic, Chip	15pF	J 50V
CV021	70041698	Cap, Chip	18nF	K 50V
CV022	24774330	Cap, Chip	33pF	J 50V
CV023	70040730	Cap, Chip	100nF	M 25V
CV024	70041504	Cap, Electrolytic	470nF	M 50V
CV025	24815272	Cap, Chip	2700pF	K 50V
CV026	70041699	Cap, Chip	100nF	K
CV027	70041118	Cap, Chip	220pF	J 50V
CV028	70041328	Cap, Chip	100nF	Z 25V
CV029	70042250	Cap, Chip	180pF	J 50V
CV031	70041530	Cap, Chip	330nF	Z 16V
CV032	70041530	Cap, Chip	330nF	Z 16V
CV033	70041654	Cap, Chip	10nF	K 25V
CV034	70041298	Cap, Electrolytic	1μF	M 50V
CV035	70041328	Cap, Chip	100nF	Z 25V
CV036	70041008	Cap, Chip	33nF	Z 50V
CV039	70041570	Cap, Electrolytic	100μF	M 6.3V
CV041	70041328	Cap, Chip	100nF	Z 25V
CV043	70041530	Cap, Chip	330nF	Z 16V
CV044	70041188	Cap, Electrolytic	10μF	M 16V
CV045	70041505	Cap, Electrolytic	3.3μF	M 50V
CV046	70041641	Cap, Electrolytic	10μF	M 50V
CV047	24285103	Cap, Chip	0.01μF	K 50V
CV048	24783180	Cap, Chip	180pF	J 50V
CV050	70041316	Cap, Electrolytic	1μF	M 50V
CV051	70041654	Cap, Chip	10nF	K 25V
CV052	70041502	Cap, Electrolytic	4.7μF	M 16V
CV053	70042102	Cap, Electrolytic	4.7μF	M 35V
CV054	70041328	Cap, Chip	100nF	Z 25V
CV056	70041118	Cap, Chip	220pF	J 50V
CV057	70041570	Cap, Electrolytic	100μF	M 6.3V
CV058	24815102	Cap, Chip	1000pF	K 50V
CV060	24774101	Cap, Chip	100pF	J 50V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
CV070	70041328	Cap, Chip	100nF	Z 25V
CV080	70041654	Cap, Chip	10nF	K 25V
CV091	70041654	Cap, Chip	10nF	K 25V
CV094	70041644	Cap, Electrolytic	47μF	M 10V
CV097	70040243	Cap, Ceramic, Chip	82pF	J 50V
CV100	24815472	Cap, Chip	4700pF	K 50V
CV101	70041654	Cap, Chip	10nF	K 25V
CV102	70041328	Cap, Chip	100nF	Z 25V
CV106	70042066	Cap, Chip	560pF	J 50V
CV107	70041654	Cap, Chip	10nF	K 25V
CV108	70041529	Cap, Chip	1μF	Z 16V
CV109	24285103	Cap, Chip	0.01μF	K 50V
CV110	70041326	Cap, Chip	56pF	J 50V
CV112	24783330	Cap, Chip	33pF	J 50V
CV113	70041514	Cap, Electrolytic	100μF	M 16V
CV114	24774479	Cap, Chip	4.7pF	
CV115	70041654	Cap, Chip	10nF	K 25V
CV116	70041654	Cap, Chip	10nF	K 25V
CV117	70041654	Cap, Chip	10nF	K 25V
CV118	70041328	Cap, Chip	100nF	Z 25V
CV119	70041654	Cap, Chip	10nF	K 25V
CV121	70041653	Cap, Chip	470pF	J 50V
CV122	70041657	Cap, Chip	22nF	K 25V
CV130	24774100	Cap, Chip	10pF	D 50V
CV131	70041654	Cap, Chip	10nF	K 25V
CV133	70040261	Cap, Ceramic, Chip	68pF	J 50V
CV134	70041592	Cap, Chip	6pF	D 50V
CV137	70041328	Cap, Chip	100nF	Z 25V
CV138	70042112	Cap, Electrolytic	47μF	M 16V
CW001	70040530	Cap, Electrolytic	100μF	M 16V
CW005	24797100	Cap, Electrolytic	10μF	M 50V
CW006	70040738	Cap, Electrolytic	4.7μF	25V
CW007	70041533	Cap, Chip	47nF	K 50V
CZ003	70041500	Cap, Electrolytic	47μF	M 50V
CZ014	70041241	Cap, Electrolytic	47μF	M 16V
CZ015	70041500	Cap, Electrolytic	47μF	M 50V
CZ021	70041631	Cap, Chip	22nF	K 50V
CZ030	24794101	Cap, Electrolytic	100μF	M 16V
CZ033	24794101	Cap, Electrolytic	100μF	M 16V
PT101	24093962	Cap, Variable	20pF	
		- RESISTORS -		
CV140	24872103	Res, Chip	10kΩ	J 1/16W
RG010	70041068	Res, Carbon	2.2kΩ	J
RG011	70040350	Res, Chip	220Ω	J 1/16W
RG012	70040350	Res, Chip	220Ω	J 1/16W
RS002	24871100	Res, Chip	10Ω	J 1/8W
RS003	70040362	Res, Chip	33kΩ	J 1/16W
RS004	24872221	Res, Chip	220Ω	J 1/16W
RS005	70040895	Res, Carbon	820Ω	J 1/4W
RS006	24872334	Res, Chip	330kΩ	J 1/16W
RS007	70040895	Res, Carbon	820Ω	J 1/4W
RS008	70040571	Res, Chip	12kΩ	J 1/16W
RS010	70041138	Res, Chip	5.6kΩ	J 1/10W
RS011	70041800	Res, Chip	4.3kΩ	J 1/10W
RS012	70040374	Res, Chip	8.2kΩ	J 1/16W
RS013	24872393	Res, Chip	39kΩ	J 1/16W
RS014	70041676	Res, Chip	2.2MΩ	K 1/10W
RS015	70040336	Res, Chip	68kΩ	J 1/16W
RS016	24871822	Res, Chip	8.2kΩ	J 1/8W
RS017	24872102	Res, Chip	1kΩ	J 1/16W
RS019	70011728	Res, Chip	20kΩ	J
RS021	70040786	Res, Carbon	33kΩ	J 1/4W
RS022	70040701	Res, Carbon	100Ω	J 1/4W
RS023	70041924	Res, Chip	430Ω	J 1/10W
RS025	24872221	Res, Chip	220Ω	J 1/16W
RS026	70041093	Chip Jumper		
RS029	24872473	Res, Chip	47kΩ	J 1/16W
RS030	70041176	Res, Chip	4.7Ω	J 1/16W
RS031	24872472	Res, Chip	4.7kΩ	J 1/16W
RS036	24871103	Res, Chip	10kΩ	J 1/8W
RS039	24871472	Res, Chip	4.7kΩ	J 1/8W
RS040	24872472	Res, Chip	4.7kΩ	J 1/16W
⚠RS041	70041671	Res, Fusible	18Ω	J 0.3W
RS042	70041096	Chip Jumper		
RS130	24872104	Res, Chip	100kΩ	J 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RT016	24871472	Res, Chip	4.7kΩ	J 1/8W
RT017	24871821	Res, Chip	820Ω	J 1/8W
RT024	24871103	Res, Chip	10kΩ	J 1/8W
RT075	24872222	Res, Chip	2.2kΩ	J 1/16W
RT100	24871201	Res, Chip	200Ω	J 1/8W
RT101	24871201	Res, Chip	200Ω	J 1/8W
RT103	24872472	Res, Chip	4.7kΩ	J 1/16W
RT105	24872563	Res, Chip	56kΩ	J 1/16W
RT106	24872182	Res, Chip	1.8kΩ	J 1/16W
RT107	24871182	Res, Chip	1.8kΩ	J 1/8W
RT108	24872563	Res, Chip	56kΩ	J 1/16W
RT109	24872471	Res, Chip	470Ω	J 1/16W
RT110	70040370	Res, Chip	680kΩ	J 1/16W
RT111	70041554	Res, Chip	4.7MΩ	K 1/16W
RT112	70041387	Res, Chip	220kΩ	J 1/10W
RT113	70041554	Res, Chip	4.7MΩ	K 1/16W
RT116	24872101	Res, Chip	100Ω	J 1/16W
RT117	70040891	Res, Carbon	470Ω	J 0.2W
RT124	24872821	Res, Chip	820Ω	J 1/16W
RT125	24871181	Res, Chip	180Ω	J 1/8W
RT126	24871562	Res, Chip	5.6kΩ	J 1/8W
RT127	24871562	Res, Chip	5.6kΩ	J 1/8W
RT128	24871273	Res, Chip	27kΩ	J 1/8W
RT129	70040784	Res, Carbon	22kΩ	J 1/4W
RT130	24871472	Res, Chip	4.7kΩ	J 1/8W
RT131	24871221	Res, Chip	220Ω	J 1/8W
RT132	24871229	Res, Chip	2.2Ω	J 1/8W
RT133	24871229	Res, Chip	2.2Ω	J 1/8W
RT134	24871114	Res, Chip	110kΩ	J 1/8W
⚠RT135	70041236	Res, Fusible	1Ω	J 0.4W
RT136	24871114	Res, Chip	110kΩ	J 1/8W
RT138	70040106	Res, Carbon	10kΩ	J 1/4W
RT139	70040852	Res, Carbon	10kΩ	J 1/4W
RT145	70040106	Res, Carbon	10kΩ	J 1/4W
RT147	24871912	Res, Chip	9.1kΩ	J 1/8W
RT148	24871102	Res, Chip	1kΩ	J 1/8W
RT149	24871182	Res, Chip	1.8kΩ	J 1/8W
RT150	24871472	Res, Chip	4.7kΩ	J 1/8W
RT151	24871472	Res, Chip	4.7kΩ	J 1/8W
RT152	24872472	Res, Chip	4.7kΩ	J 1/16W
RT153	24871102	Res, Chip	1kΩ	J 1/8W
RT155	24871473	Res, Chip	47kΩ	J 1/8W
RT156	24871473	Res, Chip	47kΩ	J 1/8W
RT159	24871222	Res, Chip	2.2kΩ	J 1/8W
RT160	24872102	Res, Chip	1kΩ	J 1/16W
RT162	24871103	Res, Chip	10kΩ	J 1/8W
RT163	70041659	Res, Carbon	220Ω	J 1/4W
RT164	24871103	Res, Chip	10kΩ	J 1/8W
RT165	70041093	Chip Jumper		
RT166	70041659	Res, Carbon	220Ω	J 1/4W
RT167	24872103	Res, Chip	10kΩ	J 1/16W
RT168	24872473	Res, Chip	47kΩ	J 1/16W
RT169	70041879	Res, Chip	30kΩ	J 1/10W
RT170	24871181	Res, Chip	180Ω	J 1/8W
RT171	24871151	Res, Chip	150Ω	J 1/8W
RT176	24871103	Res, Chip	10kΩ	J 1/8W
RT177	70040371	Res, Chip	2.2kΩ	J 1/16W
RT178	70040371	Res, Chip	2.2kΩ	J 1/16W
RT179	70041677	Res, Chip	2.2kΩ	G 1/10W
RT180	70041677	Res, Chip	2.2kΩ	G 1/10W
RT181	24871103	Res, Chip	10kΩ	J 1/8W
RT182	70041675	Res, Chip	16kΩ	J 1/8W
RT183	70040371	Res, Chip	2.2kΩ	J 1/16W
RT200	24871222	Res, Chip	2.2kΩ	J 1/8W
RT201	24871222	Res, Chip	2.2kΩ	J 1/8W
RT202	24871222	Res, Chip	2.2kΩ	J 1/8W
RT203	70040103	Res, Carbon	1kΩ	J 1/4W
RT215	70040371	Res, Chip	2.2kΩ	J 1/16W
RT300	70041096	Chip Jumper		
RT301	70041096	Chip Jumper		
RT302	70041096	Chip Jumper		
RT303	70041096	Chip Jumper		
RT304	70041096	Chip Jumper		
RT305	24871221	Res, Chip	220Ω	J 1/8W
RT306	24872221	Res, Chip	220Ω	J 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RT311	24871221	Res, Chip	220Ω	J 1/8W
RT320	24872182	Res, Chip	1.8kΩ	J 1/16W
RT321	24872182	Res, Chip	1.8kΩ	J 1/16W
RV001	70041613	Res, Chip	2MΩ	J 1/10W
RV003	24872152	Res, Chip	1.5kΩ	J 1/16W
RV004	24871102	Res, Chip	1kΩ	J 1/8W
RV005	24872512	Res, Chip	5.1kΩ	J 1/16W
RV006	24872152	Res, Chip	1.5kΩ	J 1/16W
RV007	24872331	Res, Chip	330Ω	J 1/16W
RV008	70040338	Res, Chip	680Ω	J 1/16W
RV009	24872103	Res, Chip	10kΩ	J 1/16W
RV010	70040371	Res, Chip	2.2kΩ	J 1/16W
RV014	24872101	Res, Chip	100Ω	J 1/16W
RV021	24872222	Res, Chip	2.2kΩ	J 1/16W
RV022	24872222	Res, Chip	2.2kΩ	J 1/16W
RV023	24872102	Res, Chip	1kΩ	J 1/16W
RV026	70040362	Res, Chip	33kΩ	J 1/16W
RV031	70041676	Res, Chip	2.2MΩ	K 1/10W
RV032	24872102	Res, Chip	1kΩ	J 1/16W
RV036	70040375	Res, Chip	15MΩ	J 1/16W
RV037	24872473	Res, Chip	47kΩ	J 1/16W
RV038	24872472	Res, Chip	4.7kΩ	J 1/16W
RV039	24872103	Res, Chip	10kΩ	J 1/16W
RV040	24872473	Res, Chip	47kΩ	J 1/16W
RV043	24872472	Res, Chip	4.7kΩ	J 1/16W
RV044	24872122	Res, Chip	1.2kΩ	J 1/16W
RV045	24872105	Res, Chip	1MΩ	J 1/16W
RV046	24872105	Res, Chip	1MΩ	J 1/16W
RV048	24872105	Res, Chip	1MΩ	J 1/16W
RV050	24872681	Res, Chip	680Ω	J 1/16W
RV052	24872102	Res, Chip	1kΩ	J 1/16W
RV053	70040846	Res, Carbon	820Ω	J 1/4W
RV054	24872102	Res, Chip	1kΩ	J 1/16W
RV055	24872102	Res, Chip	1kΩ	J 1/16W
RV056	70040355	Res, Chip	1.5kΩ	J 1/16W
RV057	70041093	Chip Jumper		
RV060	24871102	Res, Chip	1kΩ	J 1/8W
RV061	24872822	Res, Chip	8.2kΩ	J 1/16W
RV080	24872222	Res, Chip	2.2kΩ	J 1/16W
RV082	24872680	Res, Chip	68Ω	J 1/16W
RV083	24872823	Res, Chip	82kΩ	J 1/16W
RV092	24872681	Res, Chip	680Ω	J 1/16W
RV093	24872222	Res, Chip	2.2kΩ	J 1/16W
RV094	24872681	Res, Chip	680Ω	J 1/16W
RV095	24872101	Res, Chip	100Ω	J 1/16W
RV096	24872102	Res, Chip	1kΩ	J 1/16W
RV099	24871152	Res, Chip	1.5kΩ	J 1/8W
RV100	70040339	Res, Chip	330Ω	J 1/16W
RV101	24872821	Res, Chip	820Ω	J 1/16W
RV102	24872183	Res, Chip	18kΩ	J 1/16W
RV103	24872103	Res, Chip	10kΩ	J 1/16W
RV104	24872181	Res, Chip	180Ω	J 1/16W
RV106	24872471	Res, Chip	470Ω	J 1/16W
RV107	24872102	Res, Chip	1kΩ	J 1/16W
RV109	24872683	Res, Chip	68kΩ	J 1/16W
RV116	24872102	Res, Chip	1kΩ	J 1/16W
RV118	24872182	Res, Chip	1.8kΩ	J 1/16W
RV119	24872124	Res, Chip	120kΩ	J 1/16W
RV120	24871104	Res, Chip	100kΩ	J 1/8W
RV121	70040686	Res, Chip	1.5kΩ	J 1/8W
RV124	70040849	Res, Carbon	2.2kΩ	J
RV128	70041176	Res, Chip	4.7Ω	J 1/16W
RV129	24872681	Res, Chip	680Ω	J 1/16W
RV130	70040844	Res, Carbon	1kΩ	J 1/4W
RV132	24872102	Res, Chip	1kΩ	J 1/16W
RV133	70040373	Res, Chip	4.7kΩ	J 1/16W
RV134	70040132	Res, Chip	22kΩ	J 1/8W
RV135	70040135	Res, Chip	12kΩ	J 1/8W
RV136	24872563	Res, Chip	56kΩ	J 1/16W
RV137	70040366	Res, Chip	82kΩ	J 1/16W
RV138	70040367	Res, Chip	120kΩ	J 1/16W
RV139	70041173	Res, Chip	100kΩ	J 1/10W
RV150	24872222	Res, Chip	2.2kΩ	J 1/16W
RW001	70040118	Res, Carbon	4.7kΩ	J 1/4W
RW002	24872122	Res, Chip	1.2kΩ	J 1/16W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RW005	24871223	Res, Chip	22kΩ	J 1/8W
RW006	24872472	Res, Chip	4.7kΩ	J 1/16W
RW008	24871103	Res, Chip	10kΩ	J 1/8W
RW009	24871103	Res, Chip	10kΩ	J 1/8W
RW010	24871103	Res, Chip	10kΩ	J 1/8W
RW011	24871103	Res, Chip	10kΩ	J 1/8W
⚠RW012	70041074	Res, Fusible	27Ω	J 0.3W
RW019	24871152	Res, Chip	1.5kΩ	J 1/8W
RW020	24871152	Res, Chip	1.5kΩ	J 1/8W
⚠RW021	70040126	Res, Fusible	3.9Ω	
RW024	70040703	Res, Carbon	27kΩ	J 1/4W
RW025	70041137	Res, Chip	3.9kΩ	J 1/10W
RW027	24871339	Res, Chip	3.3Ω	J 1/8W
RW028	24871339	Res, Chip	3.3Ω	J 1/8W
RW029	24871339	Res, Chip	3.3Ω	J 1/8W
RW030	24871332	Res, Chip	3.3kΩ	J 1/8W
RZ015	70040103	Res, Carbon	1kΩ	J 1/4W
RZ030	24872911	Res, Chip	910Ω	J 1/16W
RZ031	24872102	Res, Chip	1kΩ	J 1/16W
RZ035	70041096	Chip Jumper		
RZ037	70040355	Res, Chip	1.5kΩ	J 1/16W
RZ050	24872681	Res, Chip	680Ω	J 1/16W
RZ051	70041945	Res, Chip	130Ω	J 1/10W
RZ052	24872471	Res, Chip	470Ω	J 1/16W
RZ053	24872471	Res, Chip	470Ω	J 1/16W
RZ054	70040103	Res, Carbon	1kΩ	J 1/4W
RZ055	24872102	Res, Chip	1kΩ	J 1/16W
RZ056	70041096	Chip Jumper		
RZ060	24871270	Res, Chip	27Ω	J 1/8W
RZ065	70041660	Res, Carbon	100Ω	J 0.43W
RZ066	70042251	Res, Carbon	390Ω	J 1/4W
PS034	24066742	Res, Variable	10kΩ	
JS007	70041093	Chip Jumper		
JS009	70041096	Chip Jumper		
JS012	70041093	Chip Jumper		
JS017	70041093	Chip Jumper		
JS019	70041093	Chip Jumper		
JS020	70041093	Chip Jumper		
JS021	70041093	Chip Jumper		
JS026	70041093	Chip Jumper		
JS027	70041096	Chip Jumper		
JS037	70041093	Chip Jumper		
JS039	70041093	Chip Jumper		
JS042	70041096	Chip Jumper		
JS051	70041093	Chip Jumper		
JS122	70041093	Chip Jumper		
JS123	70041093	Chip Jumper		
JS125	70041096	Chip Jumper		
JT004	70041093	Chip Jumper		
JT006	70041093	Chip Jumper		
JT009	70041096	Chip Jumper		
JT010	70012552	Coil, Peaking		
JT018	70041093	Chip Jumper		
JT032	70041093	Chip Jumper		
JT040	70012552	Coil, Peaking		
JT044	70041093	Chip Jumper		
JT083	70041093	Chip Jumper		
JT094	70040701	Res, Carbon	100Ω	J 1/4W
JT099	70041093	Chip Jumper		
JT111	70041093	Chip Jumper		
JT115	70041093	Chip Jumper		
JT127	70041093	Chip Jumper		
JT129	70041093	Chip Jumper		
JT130	70041093	Chip Jumper		
JT155	70041093	Chip Jumper		
JT156	70041093	Chip Jumper		
JT164	70041093	Chip Jumper		
JT182	70041093	Chip Jumper		
JT183	70041093	Chip Jumper		
JT185	70041093	Chip Jumper		
JT192	70041093	Chip Jumper		
JT206	70041093	Chip Jumper		
JT207	70041093	Chip Jumper		
JT214	70041093	Chip Jumper		
JT302	70041096	Chip Jumper		

LOCATION NUMBER	PART NUMBER	DESCRIPTION
JT303	70041096	Chip Jumper
JT304	70041096	Chip Jumper
JT305	70041096	Chip Jumper
JT314	70041093	Chip Jumper
JT322	70041096	Chip Jumper
JT324	70041093	Chip Jumper
JV010	70041096	Chip Jumper
JV011	70041096	Chip Jumper
JV012	70041096	Chip Jumper
JV016	70041093	Chip Jumper
JV019	70041096	Chip Jumper
JV020	70041093	Chip Jumper
JV024	70041096	Chip Jumper
JV026	70041096	Chip Jumper
JV027	70041093	Chip Jumper
JV029	70041093	Chip Jumper
JV032	70041093	Chip Jumper
JV033	70041096	Chip Jumper
JV034	70041093	Chip Jumper
JV035	70041096	Chip Jumper
JV037	70041093	Chip Jumper
JV038	70041096	Chip Jumper
JV040	70041096	Chip Jumper
JV043	70041093	Chip Jumper
JV045	70041096	Chip Jumper
JV046	70041096	Chip Jumper
JV053	70041093	Chip Jumper
JV054	70041096	Chip Jumper
JV056	70041093	Chip Jumper
JV059	70041096	Chip Jumper
JV061	70041096	Chip Jumper
JV062	70041093	Chip Jumper
JV063	70041096	Chip Jumper
JV064	70041093	Chip Jumper
JV065	70041093	Chip Jumper
JV066	70041093	Chip Jumper
JV067	70041093	Chip Jumper
JV069	70041096	Chip Jumper
JV073	70041093	Chip Jumper
JV074	70041096	Chip Jumper
JV075	70041093	Chip Jumper
JV078	70041093	Chip Jumper
JV082	70041093	Chip Jumper
JV083	70041093	Chip Jumper
JV086	70041093	Chip Jumper
JV091	70041093	Chip Jumper
JV101	70041096	Chip Jumper
JV102	70041096	Chip Jumper
JV103	70041096	Chip Jumper
JV104	70041093	Chip Jumper
JV105	70041093	Chip Jumper
JV106	70041096	Chip Jumper
JV108	70041093	Chip Jumper
JV109	70041096	Chip Jumper
JV111	70041096	Chip Jumper
JV112	70041096	Chip Jumper
JV113	70041096	Chip Jumper
JV115	70041096	Chip Jumper
JV120	70041096	Chip Jumper
JV130	70041093	Chip Jumper
JV151	70041096	Chip Jumper
JV162	70041093	Chip Jumper
JV204	70041093	Chip Jumper
JW004	70041096	Chip Jumper
JW006	70041093	Chip Jumper
JW009	70041093	Chip Jumper
JW016	70041093	Chip Jumper
JW017	70041093	Chip Jumper
JW030	70041096	Chip Jumper
JZ003	70041093	Chip Jumper
JZ012	70041093	Chip Jumper
JZ029	70041093	Chip Jumper
JZ040	70041093	Chip Jumper
JZ042	70041096	Chip Jumper
JZ045	70041093	Chip Jumper

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
JZ069	70041093	Chip Jumper		
JZ101	70041093	Chip Jumper		
		- MISCELLANEOUS -		
0010M	70012627	Tuner	FE5231	
0020M	70012022	IF Module		
BT006	70011830	Connector		
FZ051	70011260	Filter		
GT101	70011793	Photo Interrupter	GP1S562	
GT102	70011793	Photo Interrupter	GP1S562	
GT105	70011828	Hall Sensor	HW300B	
GT10A	70051136	LED Holder		
MT001	70031317	Stator		
QT100	70010116	Crystal, 32kHz		
QT101	70012167	Crystal	16MHz	
QT102	70012188	Crystal	17.734MHz	
QV018	70011960	Crystal	4.433619MHz	
ST002	70011826	Switch, Push		
■0030M	70095067	P C Board Assy	Terminal	
		- INTEGRATED CIRCUITS -		
IX001	70011881	IC	STV6400	
IX020	70011975	IC	MC14052/BCP	
IX040	70119727	IC	MC14053BCP	
IY001	70012403	IC	SDA5649	
		- TRANSISTORS -		
TG030	23114454	Transistor	DTC144E	
TX002	70010134	Transistor	BC548B	
		- DIODES -		
DG020	70010153	Diode	1N4148	
DG034	70010153	Diode	1N4148	
		- COILS -		
LX001	70010642	Coil, Peaking		
LX002	70011954	Coil, Peaking		
LY001	70011953	Coil, Peaking		
		- CAPACITORS -		
CX001	24203470	Cap, Electrolytic	47μF	M 16V
CX002	70040052	Cap, Plastic	100nF	M 63V
CX003	70040052	Cap, Plastic	100nF	M 63V
CX004	70040052	Cap, Plastic	100nF	M 63V
CX005	70040052	Cap, Plastic	100nF	M 63V
CX008	70040052	Cap, Plastic	100nF	M 63V
CX009	70041051	Cap, Electrolytic	47μF	M 16V
CX010	70040052	Cap, Plastic	100nF	M 63V
CX016	24203470	Cap, Electrolytic	47μF	M 16V
CX017	70040052	Cap, Plastic	100nF	M 63V
CX018	70042126	Cap, Ceramic	10nF	M 16V
CX023	24436271	Cap, Ceramic	270pF	J 50V
CX050	70040738	Cap, Electrolytic	4.7μF	25V
CX051	24633220	Cap, Electrolytic	22μF	M 16V
CX055	24203470	Cap, Electrolytic	47μF	M 16V
CX056	70040052	Cap, Plastic	100nF	M 63V
CX057	70040500	Cap, Plastic	8.2nF	J 63V
CX061	70040300	Cap, Ceramic	1nF	K 50V
CX070	24206479	Cap, Electrolytic	4.7μF	M 50V
CX071	70040530	Cap, Electrolytic	100μF	M 16V
CX072	24630852	Cap, Electrolytic	22μF	M 16V
CX073	70040500	Cap, Plastic	8.2nF	J 63V
CX091	70040300	Cap, Ceramic	1nF	K 50V
CY001	70041943	Cap, Chip	150pF	K 50V
CY002	70041109	Cap, Plastic	330nF	K 50V
CY003	70041187	Cap, Plastic	33nF	K 100V
CY004	70040045	Cap, Plastic	47nF	K 63V
CY005	24203470	Cap, Electrolytic	47μF	M 16V
CY010	70041920	Cap, Chip	2200pF	K 50V
		- RESISTORS -		
RG020	70040963	Res, Carbon	8.2kΩ	J 1/4W
RG021	70041665	Res, Carbon	5.6kΩ	J 1/4W
RG030	70040844	Res, Carbon	1kΩ	J 1/4W
RG031	70040852	Res, Carbon	10kΩ	J 1/4W
RG032	70040846	Res, Carbon	820Ω	J 1/4W
RG034	70040963	Res, Carbon	8.2kΩ	J 1/4W
RG035	70041665	Res, Carbon	5.6kΩ	J 1/4W
RG057	70040845	Res, Carbon	680Ω	J 1/4W
RX002	70040842	Res, Carbon	470Ω	J
RX021	70040844	Res, Carbon	1kΩ	J 1/4W

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
RX023	70040963	Res, Carbon	8.2kΩ	J 1/4W
RX024	70040852	Res, Carbon	10kΩ	J 1/4W
RX025	70040848	Res, Carbon	100kΩ	J
RX033	70040848	Res, Carbon	100kΩ	J
RX050	70041666	Res, Carbon	470kΩ	J 1/4W
RX051	70041664	Res, Carbon	220kΩ	J 1/4W
RX053	70040844	Res, Carbon	1kΩ	J 1/4W
RX054	70040848	Res, Carbon	100kΩ	J
RX060	70041665	Res, Carbon	5.6kΩ	J 1/4W
RX061	70041665	Res, Carbon	5.6kΩ	J 1/4W
RX070	70041664	Res, Carbon	220kΩ	J 1/4W
RX071	70041666	Res, Carbon	470kΩ	J 1/4W
RX072	70040844	Res, Carbon	1kΩ	J 1/4W
RX073	70040845	Res, Carbon	680Ω	J 1/4W
RX080	70041663	Res, Carbon	75Ω	J 1/4W
RX081	70040838	Res, Carbon	68Ω	J 1/4W
RX089	70040845	Res, Carbon	680Ω	J 1/4W
RX090	70041665	Res, Carbon	5.6kΩ	J 1/4W
RX091	70041665	Res, Carbon	5.6kΩ	J 1/4W
RX092	70041663	Res, Carbon	75Ω	J 1/4W
RX093	70040838	Res, Carbon	68Ω	J 1/4W
RX094	70040848	Res, Carbon	100kΩ	J
RX095	70040848	Res, Carbon	100kΩ	J
RX096	70040848	Res, Carbon	100kΩ	J
RX097	70040845	Res, Carbon	680Ω	J 1/4W
RX212	70041667	Res, Carbon	12kΩ	J 1/4W
RX213	70040811	Res, Carbon	3.3kΩ	J
RY001	70040849	Res, Carbon	2.2kΩ	J
RY002	70041668	Res, Carbon	1MΩ	J 1/4W
RY003	70041669	Res, Carbon	1.2MΩ	J 0.14W
RY004	70040851	Res, Carbon	6.8kΩ	J
RY006	70040848	Res, Carbon	100kΩ	J
RY009	70040851	Res, Carbon	6.8kΩ	J
RY010	70041669	Res, Carbon	1.2MΩ	J 0.14W
0110	70095117	Power Assy		
■0150M		P C Board Assy	Power	
		- INTEGRATED CIRCUITS -		
IP001	70011972	IC	U4614B	
IP002	70011699	IC	LM393N	
		- TRANSISTORS -		
TP001	70011962	Transistor, Chip	BUL310XI	
TP091	70011386	Transistor	2SA1020-Y	
		- DIODES -		
DP001	70012286	Diode	1N4007	
DP002	70012286	Diode	1N4007	
DP003	70012286	Diode	1N4007	
DP004	70012286	Diode	1N4007	
DP007	70012469	Diode	BA157	
DP008	70010817	Diode	1N4148	
DP009	70010817	Diode	1N4148	
DP041	70012469	Diode	BA157	
DP051	70012434	Diode	BAV20	
DP052	70012434	Diode	BAV20	
DP061	70011965	Diode	BA157	
DP071	70012434	Diode	BAV20	
DP080	70010417	Diode	1N5822	
DP090	70011964	Diode	FUF5404	
DP093	70010817	Diode	1N4148	
DP094	70011286	Diode, Zener	ZPD5.6	
DP095	70010955	Diode	MUR115	
		- COILS -		
LP051	70010922	Coil, Peaking		
LP071	23238916	Coil, Peaking	TRF4330AC	
LP081	70011955	Coil, Peaking		
LP091	70011952	Coil, Peaking		
		- CAPACITORS -		
⚠CP001	70040056	Cap, Plastic	100nF	M 275V
⚠CP002	70041047	Cap, Electrolytic	47μF	M 385V
⚠CP003	70041646	Cap, Ceramic	2.2nF	M 400V
CP004	70041370	Cap, Ceramic	100pF	K 1kV
CP005	24774100	Cap, Chip	10pF	D 50V
CP006	70041656	Cap, Chip	4.7nF	M 50V
CP007	24797100	Cap, Electrolytic	10μF	M 50V
CP008	70040725	Cap, Electrolytic	100μF	M 25V

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
CP009	70041532	Cap, Chip	330pF	J 50V
CP015	70041653	Cap, Chip	470pF	J 50V
CP020	70041532	Cap, Chip	330pF	J 50V
CP041	70040412	Cap, Electrolytic	220μF	M 10V
CP051	24636010	Cap, Electrolytic	1μF	M 50V
CP054	24797100	Cap, Electrolytic	10μF	M 50V
CP055	70040096	Cap, Ceramic	470pF	M 400V
CP056	70041633	Cap, Plastic	10nF	K 100V
CP061	70041638	Cap, Electrolytic	470μF	M 25V
CP071	70040772	Cap, Electrolytic	47μF	M 50V
CP072	70041562	Cap, Chip	100nF	Z 50V
CP073	70040096	Cap, Ceramic	470pF	M 400V
CP081	70041637	Cap, Electrolytic	1000μF	M 16V
CP082	70040772	Cap, Electrolytic	47μF	M 50V
CP092	70041638	Cap, Electrolytic	470μF	M 25V
CP093	70040772	Cap, Electrolytic	47μF	M 50V
CP094	70041328	Cap, Chip	100nF	Z 25V
CP095	70040980	Cap, Chip	100pF	J 50V
		- RESISTORS -		
RP001	24872103	Res, Chip	10kΩ	J 1/16W
RP002	24871153	Res, Chip	15kΩ	J 1/8W
RP003	24872823	Res, Chip	82kΩ	J 1/16W
RP004	24872223	Res, Chip	22kΩ	J 1/16W
RP005	24872223	Res, Chip	22kΩ	J 1/16W
RP006	24872223	Res, Chip	22kΩ	J 1/16W
RP007	24872223	Res, Chip	22kΩ	J 1/16W
RP008	24872473	Res, Chip	47kΩ	J 1/16W
RP009	24872104	Res, Chip	100kΩ	J 1/16W
RP010	24871153	Res, Chip	15kΩ	J 1/8W
RP011	24871153	Res, Chip	15kΩ	J 1/8W
RP012	24871153	Res, Chip	15kΩ	J 1/8W
RP013	70041917	Res, Chip	6.8kΩ	F 1/10W
RP014	24872222	Res, Chip	2.2kΩ	J 1/16W
RP015	70041678	Res, Chip	3.9Ω	K
RP016	24872330	Res, Chip	33Ω	J 1/16W
RP017	24871100	Res, Chip	10Ω	J 1/8W
⚠RP018	70041078	Res, Fusible	1.5Ω	J 0.3W
RP019	24871182	Res, Chip	1.8kΩ	J 1/8W
RP020	24872270	Res, Chip	27Ω	J 1/16W
⚠RP021	70041673	Res, Fusible	2.2kΩ	J 0.3W
RP022	24872104	Res, Chip	100kΩ	J 1/16W
RP023	24871334	Res, Chip	330kΩ	J 1/8W
RP024	24871334	Res, Chip	330kΩ	J 1/8W
RP025	24871334	Res, Chip	330kΩ	J 1/8W
RP026	24872473	Res, Chip	47kΩ	J 1/16W
RP027	24871153	Res, Chip	15kΩ	J 1/8W
RP028	24871153	Res, Chip	15kΩ	J 1/8W
RP031	24872393	Res, Chip	39kΩ	J 1/16W
RP032	24872752	Res, Chip	7.5kΩ	J 1/16W
⚠RP041	70041081	Res, Fusible	0.1Ω	F 0.4W
⚠RP042	70040456	Res, Fusible	10Ω	J
⚠RP051	70041116	Res, Fusible	39Ω	J 0.3W
RP052	24871102	Res, Chip	1kΩ	J 1/8W
RP053	24872473	Res, Chip	47kΩ	J 1/16W
RP054	24872822	Res, Chip	8.2kΩ	J 1/16W
RP057	24872333	Res, Chip	33kΩ	J 1/16W
RP061	24871682	Res, Chip	6.8kΩ	J 1/8W
RP062	24871682	Res, Chip	6.8kΩ	J 1/8W
RP063	24871682	Res, Chip	6.8kΩ	J 1/8W
⚠RP071	70040125	Res, Carbon	47Ω	J 0.3W
RP072	24871153	Res, Chip	15kΩ	J 1/8W
RP089	24872152	Res, Chip	1.5kΩ	J 1/16W
⚠RP091	70041081	Res, Fusible	0.1Ω	F 0.4W
⚠RP092	70041670	Res, Fusible	120Ω	J 0.3W
RP093	24872682	Res, Chip	6.8kΩ	J 1/16W
RP094	70040895	Res, Carbon	820Ω	J 1/4W
RP095	24872393	Res, Chip	39kΩ	J 1/16W
RP096	70041880	Res, Chip	1kΩ	F 1/10W
RP097	70041679	Res, Chip	1.5kΩ	F 1/10W
JP001	70041093	Chip Jumper		
JP010	70041093	Chip Jumper		
JP011	70041093	Chip Jumper		
		- MISCELLANEOUS -		
⚠BP001	70011176	Inlet		
⚠FP001	70010445	Fuse, 1A, 250V		

LOCATION NUMBER	PART NUMBER	DESCRIPTION		
FP01A	70010597	Fuse Holder		
⚠LP001	70011950	Line Filter		
⚠LP002	70011949	Line Filter		
⚠LP020	70011948	Power Transformer		
0209	70095059	KDB/FCB Assy		
■0210M		P C Board Assy	KDB	
		- INTEGRATED CIRCUITS -		
IK01	70012623	IC	TMP87CM70AF-6413	
		- TRANSISTORS -		
TK04	A6004010	Transistor, Chip	RN1401	
TK05	A6325549	Transistor	2SC2236-Y	
		- DIODES -		
DK01	70011969	Diode, Zener	ZMM5.6V	
DK11	70011582	Diode, LED	SE303AC-YD	
DK12	70011582	Diode, LED	SE303AC-YD	
DK13	70011582	Diode, LED	SE303AC-YD	
		- CAPACITORS -		
CK01	70041690	Cap, Chip	30pF	J 50V
CK02	70041690	Cap, Chip	30pF	J 50V
CK03	70041376	Cap, Chip	10nF	Z 50V
CK04	70041376	Cap, Chip	10nF	Z 50V
CK05	70041376	Cap, Chip	10nF	Z 50V
CK06	70041376	Cap, Chip	10nF	Z 50V
CK07	24814223	Cap, Chip	2200pF	Z 50V
CK09	70040243	Cap, Ceramic, Chip	82pF	J 50V
CK22	70040647	Cap, Electrolytic	47μF	M 10V
CK23	70041292	Cap, Electrolytic	100μF	M 6.3V
		- RESISTORS -		
RK01	70040350	Res, Chip	220Ω	J 1/16W
RK02	70040350	Res, Chip	220Ω	J 1/16W
RK03	70040350	Res, Chip	220Ω	J 1/16W
RK04	70040350	Res, Chip	220Ω	J 1/16W
RK05	70040373	Res, Chip	4.7kΩ	J 1/16W
RK101	70040391	Chip Jumper		
RK28	70040373	Res, Chip	4.7kΩ	J 1/16W
RK29	70041709	Res, Chip	2.2kΩ	G 1/10W
RK30	70040358	Res, Chip	10kΩ	J 1/16W
RK32	70040337	Res, Chip	270Ω	J 1/16W
RK33	70040340	Res, Chip	47Ω	J 1/16W
RK34	70041168	Res, Chip	15Ω	J 1/10W
RK35	70041168	Res, Chip	15Ω	J 1/10W
RK36	70041138	Res, Chip	5.6kΩ	J 1/10W
RK38	70041618	Res, Oxide Mental	3.3Ω	J 1W
RK40	70040373	Res, Chip	4.7kΩ	J 1/16W
RK41	70041171	Res, Chip	1.2kΩ	J 1/10W
RK44	70011425	Res, Chip	3kΩ	
RK45	70011425	Res, Chip	3kΩ	
RK46	70011425	Res, Chip	3kΩ	
RK47	70011425	Res, Chip	3kΩ	
RK48	70011425	Res, Chip	3kΩ	
RK51	70040354	Res, Chip	1kΩ	J 1/16W
RK53	70040354	Res, Chip	1kΩ	J 1/16W
RK56	70011426	Res, Chip	2kΩ	
RK61	70041389	Res, Chip	6.2kΩ	J 1/10W
RK75	70041712	Res, Chip	9.1kΩ	J 1/10W
		- MISCELLANEOUS -		
GK01	70012522	FIP	6-MT-255GNAK	
QK01	70010937	Resonator	8MHz	
SK01	23344094	Push Switch		
SK02	23344094	Push Switch		
SK05	23344094	Push Switch		
SK06	23344094	Push Switch		
SK07	23344094	Push Switch		
SK08	23344094	Push Switch		
SK09	23344094	Push Switch		
ZK01	70012418	F.U.	GP1U281X	
■0212M		P C Board Assy	FCB	
		- RESISTORS -		
RK52	70040354	Res, Chip	1kΩ	J 1/16W
RK73	70040374	Res, Chip	8.2kΩ	J 1/16W
		- MISCELLANEOUS -		
BK01B	23164505	Plug, 3P		
SK03	23344094	Push Switch		

SPECIFICATIONS

SYSTEM

Format	:	VHS standard
Recording system	:	Rotary, 2-head helical scan system
Video heads	:	4 heads
Video signal system	:	CCIR; 625 lines, 50 fields, PAL colour signal, NTSC colour, 525 lines
Tape speed	:	SP : 23.39 mm/s (PAL) SP : 33.35 mm/s (NTSC)
		LP : 11.70 mm/s (PAL) SLP : 11.12 mm/s (NTSC)
Recording time	:	SP : 240 minutes with E240 cassettes (PAL), LP : 480 minutes with E240 cassettes (PAL)
Winding time	:	Approx. 110 seconds with E180 cassettes
Dimensions	:	370 (W) × 89 (H) × 307 (D) mm
Mass	:	4.0 kg
Operating temperature	:	+5 to +40°C
Operating humidity	:	Less than 80% RH
Mains power	:	230/240 V AC, 50 Hz
Power consumption	:	21 W (in operation)

CONNECTORS

Aerial input	:	75 Ω coaxial
Aerial output	:	75 Ω coaxial
Video input	:	AUDIO/VIDEO SCART socket, 1.0 V(p-p), 75 Ω
Audio input	:	AUDIO/VIDEO SCART socket, 308 mV(rms), more than 10 kΩ
Video output	:	AUDIO/VIDEO SCART socket, 1.0 V(p-p), 75 Ω
Audio output	:	AUDIO/VIDEO SCART socket, 308 mV(rms), less than 1.0 kΩ

VIDEO

Signal-to-noise ratio	:	More than 43 dB (SP tape speed/PAL)

AUDIO

Signal-to-noise ratio	:	More than 42 dB (SP tape speed/PAL/normal mono)
Frequency range	:	80 Hz to 10,000 Hz

TIMER

Clock	:	24-hour digital indication
No. of events	:	6 events 1 month

TUNER

System	:	Frequency synthesizer
Channel coverage	:	PAL I VHF: A – J, UHF: E21 – E69 CATV: 1 – 53, S01 – S41
RF converter	:	UHF channel 60 (50 – 67, adjustable), System-I

Designs and specifications are subject to change without notice.